August 1950

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EDISON ELECTRIC INSTITUTE BULLETIN

Page

The Electric Company's Larger Responsibility
HOWARD J. CADWELL 293

The Oklahoma Gas & Electric Company's Program for Keeping Supervisors and Employees Informed
WILLIAM R. WOLFE 297

Significance of Accounting Results for Rate Regulation
J. RHOADS FOSTER 299

Safety Through Training . . . . . G. S. VAN ANTWERP 303

An Analysis of the Effect of the Life of Hardware Items of Overhead Pole Line Structures on Overall Annual Costs
E. W. OESTERREICH 307

New Targets . . . . . A. G. MAYER 317

Personals 320

Conventions and Meetings 324

PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

April, 1949-1950

SOURCE AND DISPOSAL OF ENERGY—MONTH OF APRIL

	1950	1949	%
GENERATION* (Net)			
By Fuel Burning Plants	17,140,354,000	15,057,217,000	+13.8
By Water Power Plants	8,296,629,000	8,157,535,000	+ 1.7
Total Generation	**25,436,983,000**	**23,214,752,000**	**+ 9.6**
Add—Net Imports Over International Boundaries	131,060,000	126,400,000	+ 3.7
Less—Company Use	117,100,000	119,121,000	− 1.7
Less—Energy Used by Producer	504,749,000	383,813,000	+31.5
Net Energy for Distribution	**24,946,194,000**	**22,838,218,000**	**+ 9.2**
Losses and Unaccounted for	2,549,287,000	2,437,097,000	+ 4.6
Sales to Ultimate Customers	**22,396,907,000**	**20,401,121,000**	**+ 9.8**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of April 30th			
Residential or Domestic	36,167,645	34,115,143	+ 6.0
Rural (Distinct Rural Rates)	1,566,874	1,706,548	− 8.2†
Commercial or Industrial:			
Small Light and Power	5,367,834	5,161,885	+ 4.0
Large Light and Power	226,111	228,300	− 1.0
Other Customers	150,475	143,858	+ 4.6
Total Ultimate Customers	**43,478,939**	**41,355,734**	**+ 5.1**
KILOWATTHOUR SALES—During Month of April			
Residential or Domestic	5,521,498,000	4,760,406,000	+16.0
Rural (Distinct Rural Rates)	604,857,000	531,575,000	+13.8
Commercial or Industrial:			
Small Light and Power	3,985,776,000	3,684,560,000	+ 8.2
Large Light and Power	10,930,026,000	10,124,907,000	+ 8.0
Street and Highway Lighting	221,113,000	204,935,000	+ 7.9
Other Public Authorities	581,437,000	522,199,000	+11.3
Railways and Railroads:			
Street and Interurban Railways	287,823,000	312,460,000	− 7.9
Electrified Steam Railroads	208,945,000	212,367,000	− 1.6
Interdepartmental	55,432,000	47,712,000	+16.2
Total To Ultimate Customers	**22,396,907,000**	**20,401,121,000**	**+ 9.8**
Revenue from Ultimate Customers	**$410,075,600**	**$374,735,300**	**+ 9.4**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended April 30th			
Kilowatthours per Customer	1,740	1,607	+ 8.3
Average Annual Bill	$50.81	$47.89	+ 6.1
Revenue per Kilowatthour	2.92¢	2.98¢	− 2.0

* By Courtesy of the Federal Power Commission.
† Negative Percentage due to Reclassification.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 18 AUGUST, 1950 No. 8

The Electric Company's Larger Responsibility

By Howard J. Cadwell

President, Western Massachusetts Electric Company

An address before the New England Regional Forum on Rural and Urban Development sponsored by the Rural and Urban Development Committee, EEI, Boston, Mass., May 24, 1950

WHEN we look back over the history of the last 18 years, the success of the electric companies in the face of enormous handicaps certainly justifies superlatives.

Electric Industry Record

1. Our industry had to slug its way through the Great Depression along with the rest of American industry.
2. We met the enormous impact of World War II with flying colors —and came through with flying colors.
3. We were able to absorb without shortage the postwar upsurge of power demand and have met successfully the great problems of expansion-financing in the face of tax laws best designed to *discourage* sound financing.
4. Our product is alone among the necessities of life in its counter-inflationary price movement.

With a record like this, it is not surprising that our companies are held in somewhat higher public esteem than they were nearly 20 years ago. Certainly we have the right to feel that our modern record should have erased some of the mistakes which our industry, along with many others, may have made during the roaring 20's.

As the shadow of public power looms over us, it is not unnatural that we should remind our customers, our stockholders, and our employees of our great accomplishments. Our achievements do make the strongest kind of ammunition against public power, and any false modesty on this score would be serving no one but the opposition.

Equivocation Will Not Defeat Socialism

Furthermore, our industry at last seems to have taken its gloves off in dealing with the creeping variety of socialism which is slowly but surely penetrating the American structure. I am glad that we have overcome a natural timidity, and that we are dealing with these ideological matters in a practical and factual manner. Equivocation will never defeat socialism—in fact, socialists fatten on the tendency of individual elements in their opposition to pass-the-buck in the matter of resistance.

If we may agree that the electric companies have a strong record in the making and distributing of electricity, if we may agree that the electric companies are effectively telling the public the story of their good performance, and if we may agree that the electric companies are developing a strong educational program with which to meet the socialist threat, then we may assume that they are doing everything possible to make our industry and our country strong? In short, may we assume that a continuation of our present efforts assures our continued existence as free enterprises in the future—say, in the year 1960?

Ideological Chess

I feel no such assurance. It is true that practically all the polls taken today show that the majority of people do not want the government to usurp further proprietary functions in the field of business. Specifically, the polls show that the great majority of the people do not want government to take over the electric power business. Yet, the process goes on. Obscure moves are made in this great game of ideological chess which our wary eyes can detect as pushing the electric companies into an untenable position—moves which the lay observer does not recognize because of their subtle character.

Larger Responsibility to Community

Because of all this, it seems to me that something further is needed. It seems to me that we should vigorously pursue all the lines along which we are now working, but we should give more thought to our larger responsibility to the communities and regions which we individually serve. In the last analysis, our continued existence will be justified by our indispensability to those communities. It isn't enough to make and deliver kilowatthours. (Mr. Public Kilowatt can brown a slice of toast just as brown as Mr. Reddy Kilowatt.) Nor will it be enough to extol our good performance. Nor will it be enough to throw our spotlight on the disciples of Fabius—the social planners.

We may get a lot of sympathy through our present activities, and if the tide turns strongly enough toward dynamic free enterprise, we may get some respite. But it is my premise that when the "chips are down" it will be the degree to which our business-citizenship

has made us *indispensable* to our communities that will determine whether we remain individual business enterprises or become alphabetical authorities.

The one man who seems to have recognized this truth ahead of the rest of us, and has successfully acted upon it, is our good friend Clint Spurr down at the Monongahela Power Company.

The Question of "Propriety"

Before delving into the specific problems raised by such a program, it might be well to deal with the question of "propriety." It would certainly be the height of irony if the electric companies in their zeal to keep the dead hand of government out of their own business were to engage in the sort of bureaucratic boondoggling which they so strongly decry.

Furthermore, we would be subject to regulatory rebuke if we spent large amounts of ratepayer or shareholder money on projects unrelated to the production and distribution of electric energy.

Finally, it would be particularly unfortunate if our assumption of greater responsibility in the economic life of the community should result in deviation from our long-established adherence to political non-partisanship.

Actually, it would appear that our new activities, if properly planned, can readily avoid the pitfalls. These hazards will be kept in mind as we explore the possibilities of establishing our indispensability as business citizens.

Now let us consider the various elements in a broad program of business and community leadership:

WAYS AND MEANS

Service

Although I have said that something more than good service is indicated, and although I have said that our service standards are high, it seems to me that any electric company instituting a program of community development should first review its present business activities.

Nothing could be unhappier than the erection of a program of broad community help on a service-foundation which has flaws and weaknesses. Let's not have somebody throw this remark at us: "You'd better learn to run your own business before you tell anybody else how to run his!!" Actually, none of us has reached a state of perfection in our everyday business methods and standards of electric service.

How can we tell that they are reasonably adequate? To a considerable degree, a good idea may be had if administrative personnel will shun complacency, keep an open mind, and a very sensitive ear to the ground. In our own company, we have found customer polls rather useful—particularly where they provide standards of comparison with other utility services.

Community Activities of Personnel

Probably it is unnecessary to emphasize the basic importance of our personnel's participation in the wide range of extra-curricular activities such as: Service clubs, fund-raising campaigns, chambers of commerce, church groups, farm organizations, youth activities, hospital boards, etc. From what I have observed, no other industry in the country has a group of employees which volunteers for so many of these activities which make up the strength and fibre of American life.

However, before programming a broader community activity, the electric company should review this coverage. It may be found that in certain towns your personnel has lagged a little in this field. I have sometimes noticed a tendency for our people in a community to be very active in outside organizational work for a period of time, and then to let down—apparently with a feeling that they have discharged their responsibility to the community—have "graduated" so to speak.

From my own company's experience to date in broadening its community responsibilities, I have been forcibly impressed with the fact that the wide participation of our employees in all sorts of community clubs and organizations provides the contacts and the channels through which our broader program can be presented and sold.

Although the following may seem like a slight digression into operating policy, there is another point which I think should be made here. A tendency to over-centralize the business offices of a utility sacrifices intimacy of community contact—and hardly lays a sound basis for community development. Here we are up against a problem of efficiency and economy. Those companies which use the so-called "D-R" system probably feel that they have solved this problem of close human contact. However, it has been my experience that a little practical thought and planning (under any system) can take the curse off main-office remoteness without undue cost or loss of efficiency.

Industrial Development

In our projected broader role, assistance in industrial development would seem to take top priority—at least here in New England. There are several reasons for this statement:

1. Industrial development is tied in with the fate of the New England economy.
2. Expansion of our domestic and commercial sales is very largely dependent on the aggregate industrial payroll.
3. Industry buys a large portion of our kilowatthour output.
4. Our activity in the field of industrial development can never be challenged as to "propriety."

In many ways, it is like "bringing coal to Newcastle" to lecture this group on the details of industrial development. Many of you have had years of direct contact with problems in this field. What I should like to address myself to is the philosophy of industrial enhancement and the way the electric companies might organize themselves with respect to the broader aspects of the subject.

Direct industrial sales activities as now conducted are close to the heart of industrial development. To my mind it is unfortunate—a hiding of our light under a bushel—to confine industrial activity within the "sales" name and category. The sales label may result in keeping this work within too narrow a channel.

Industrial Sales Staff Helps

Furthermore, people tend to lose sight of the important contribution to the community which often results from the routine activities of the industrial sales staff. Undoubtedly, many of you can think of instances in your own communities where an intelligent industrial application of electricity, developed and sold by your own organization, has meant the difference between red and black on a given manufacturer's books —a difference which may conceivably have saved or enlarged an industry for your community.

It seems to me that direct industrial sales, *i. e.*, the application of electricity to the industrial process, should be a central activity of an industrial develop-

ment department—which, in turn, may be an arm of an area- or territorial-development department.

Without going into the mechanics of selling electrical applications, listing industrial property, spotting and advertising factory sites (about which mechanics you probably know a lot more than I do), it seems to me that there is one other point which must be considered: The electric utility industrial department will probably have to spark this community activity, but we will be making a great mistake if we do not keep in constant check with all other agencies normally concerned with industrial enhancement.

Chambers of commerce and various regional development associations have their own industrial departments and committees. Due to budgetary and personnel inadequacies, these other agencies have found it difficult to achieve very much in the industrial field. That is one of the things that seems to be bothering New England people. Let's throw our self-interest and our trained forces and all our resources into this activity, but let's integrate all other agencies with our efforts—and see that they get full credit. Again I refer to the same Mr. Spurr. He says that we will get all the credit we deserve without publicly beating our own drum. And we will make ourselves *indispensable* to a lot of other people.

Agricultural Development

Here again we have another of the ingredients—a full-blown area development item in connection with which we are already doing a big job in most electric companies. However, in some companies that job is pretty well split up. One department works out the line extension guarantees, contracts, etc. Another department may sell the electrical farm equipment. Sometimes an entirely different branch of the sales department has the responsibility for the canvassing of the household appliance situation before the bottled-gas boys get there.

Whether or not such separation exists in your own company, it would seem that the whole farm relationship should be pulled together as another important segment of the area development program.

One of the items which I mentioned under the heading of "propriety" was the danger of superimposing our own little bureaucracy on those bureaus supported by government. This is a particular danger in this rural field. The ratio of farm-advisors to farmers has already soared so high that one wonders how agriculture can support all the experts—even with the aid of Federal price subsidies.

Again, without trying to detail the mechanics, I question whether much additional personnel is needed in our staffs. A little reorganizational effort to take a broader view of our rural program may be in order, together with a survey and overhauling of our educational work and media—radio, farm magazines, bill enclosures, our relationships with the agricultural colleges. You may find that there is an advantage in simply integrating your present program without violent change, and publicly defining it is an important part of your community development setup. Here again the best way to get cooperation, results, and credit, is to work with and through all other farm agencies.

Recreation, Tourism and Area Boosting

In pointing up the industrial and farm segments of our community- or area-development program, I have suggested that the main job is one of reorganization and broadening activities in which the electric companies are already engaged in varying degrees.

Now it seems to me that we have a little different problem with the field of activity which is sometimes termed "recreation and tourism" by the various state and regional development groups. For some reason, most of us have shied away from this field in so far as active support from the electric company is concerned.

Whether we have felt that such activity is a little too frivolous for our dignities, or whether we fail to see a justifiable connection with our pocketbooks, I do not know. Certainly it is a little less specific and concrete than is industrial and farm development, and there is less direct sales activity in connection with it. However, I do believe that there is an important undeveloped opportunity here for our New England electric companies—a field for electric company activity along lines which will meet the test of propriety which I previously emphasized.

Very probably you are all familiar with the startingly large figures developed by various New England agencies in evaluating the vacation industry. How can we look at these figures without considering their impact on the electric bills of hotels, filling stations, restaurants, tourist homes, and dozens of other commercial establishments? How much have we done for this class of customer over and above performing our bare duty in the supplying of electricity?

Perhaps we have helped this customer group with their lighting and commercial cooking somewhat, but I think it is generally true that our domestic home service programs and our industrial and farm programs have been on a more completely helpful and personal basis than is the case with that segment of our excellent commercial market which derives its revenue from the traveller. Very often, for instance, the tourist home has had to accept a commercial classification as to rate, which involved costs above those available under the domestic schedule. Wouldn't it be a good idea to give a little thought to the problems of the tourist home and to our sales possibilities in that direction?

Perhaps a certain amount of advertising through various channels designed to increase the overnight stops of tourists in our various service areas would be appreciated. Perhaps a bill enclosure to the tourist home segment of our customers, enumerating the minimum standards which they should observe would be helpful. (This happens to be an active item with various New England promotional agencies at this time.)

Community Bragging

Beyond that, how about assuming leadership in doing some community bragging—a little more of the Miami and California technique? Paradoxically enough, the best boosting job we could do would be to sell New England to its own people. We New Englanders are a cross-grained lot. We seldom praise our beautiful New England; yet most of us prefer it to any other part of the world. Generally speaking, we are poor individual boosters for the physical attractions of New England. The electric companies in New England are sending out to their customers millions of mailings a year in the form of electric bills. How inexpensive it would be to adopt a bill enclosure program which would sell New England to New Englanders and put in their minds the ideas and phrases which they can use to sell New England to others.

If the electric companies of New England could become the authors and

salesmen of a slogan which meant in essence that "New England is the best place in the world"—if that slogan should catch on—imagine the service we would have done our community!

There are other interesting possibilities, which I shall not try to detail, and which involve maps and guide books for tourists and recreation seekers.

Good Service and Individual Citizenship

Up to this point we have mentioned two prerequisites of a community development program—good service and individual citizenship—and we have discussed three main elements of such an organized program: industrial development, agricultural development, and the tourist phase of recreational development. And up to this point, we haven't wandered very far off the beaten track. Each electric company is already doing some of the things I have mentioned. They all stand the test of propriety—they all affect, demonstrably, our self-interest.

Without going further afield, we have the elements of a so-called community- or area-development program. In my own company, we found it not too difficult to pull these activities together under one main heading that we call an Area Development Department. (We selected that name because of the publicity play we could make on its initials—ADD.) We found, furthermore, that not too many people had to be added to our organization. The job was partly one of reorganization—to place upon a sort of "steering group" the responsibility: (1) for watching all those present activities of the company which bear on community development; (2) for stepping up certain projects; (3) for filling any gaps in our present range of effort; and (4) for tying the whole thing together.

From what I have seen, this business of coordinating the effort is the most difficult. Various departments and department heads must be convinced of the value of the program so that they will lend their assistance—help make the plan work. In fact, everybody in the company from the President (inclusive) down should, as I see it, be an extension of the electric company's area development department.

Coordination With Other Organizations

Then there is the problem of coordinating the electric company's efforts with those of numerous outside organizations working in the same direction—there are literally dozens of them. We must have a friendly and mutually helpful relationship with these outside groups—otherwise we can do our public relations great harm.

Need for Diplomacy

From this you can see that the quality needed above all others in your director of community development is that of diplomacy. He must be original and resourceful to a high degree. He must also be practical—it is all too easy to go "overboard" in such a large field.

To sum up, the director of community development department should be, as I see it, a coordinator and a gadfly. He can't begin to do such a big job single-handed, nor can his department do it without help from many others in the electric company and the community. But to the extent that he is successful in pushing, needling and cajoling others into affirmative action, he will be doing something that is sadly needed for our New England area. He will be helping the electric company to fulfill its large responsibility to the community—helping the electric company to make itself an indispensable community asset—helping the electric company to make a profit. A good, healthy set of objectives!

Connecticut Light & Power Inaugurates Community Development Plan

R. H. KNOWLTON, president of The Connecticut Light and Power Company, has announced that the power company has inaugurated a plan to help the various communities in its territory in promoting and furthering industrial development. Specific examples of the way in which the company is ready and willing to assist the communities include any or all of the following methods: community surveys; aid in preparing promotional materials; organization of industrial foundations; help in locating prospects; and engineering aid to existing industry.

Mr. Knowlton said that arrangements for securing the proposed aid will be handled through The Connecticut Light and Power Company district offices and that the general guidance of the activity will be under the direction of P. V. Hayden, executive assistant, public relations department. "In addition," he stated, "the company will, of course, continue its present policy of cooperating to the fullest extent with existing agencies working toward the same goal, such as the New England Council, the Connecticut Development Commission and Chambers of Commerce.

Industrial Maturity in New England

"Our company, like many others, has been disturbed lately," Mr. Knowlton continued, "by the allegations appearing widely in the press about the loss of New England industry to other parts of the country. All of the reliable statistics available today, and there are many, clearly disprove these pessimistic statements. It is true that some areas in the country have grown faster in the last few years than New England since many of them started with nothing while New England has long since achieved industrial maturity.

Corporate Citizen of Connecticut

"New England experienced a much earlier and more widespread industrial development than many sections so that it isn't reasonable to expect that we can maintain an equal industrial expansion with these younger areas. That does not mean, however, that we in New England and Connecticut can ignore our problems. CL&P makes this offer in its continuing effort to assist in solving our own New England problems at the grass root levels and to discharge fully its obligations as a corporate citizen of Connecticut."

Mr. Hayden, who will direct the program, was a charter member of the Connecticut Development Commission and served two terms as a Commissioner. He is currently a member of the Rural and Urban Development Committee of the Edison Electric Institute, and Chairman of its Civic Development subcommittee. He has also served for many years as a member of the Industrial Development Committee of the New England Council.

The Oklahoma Gas & Electric Company's Program for Keeping Supervisors and Employees Informed

By William R. Wolfe
Vice President, Oklahoma Gas & Electric Company

WE all know that management and employee unity is essential. To achieve that end it is important to have a plan for keeping employees informed of the many activities and policy changes that occur regularly in an electric utility.

When a company is small, communication is relatively simple and every one can be kept well informed regarding changes and developments. As the company expands, its property and personnel are increased and it becomes more difficult to keep channels of communication open.

When the Oklahoma Gas and Electric Company was organized in 1902 it served only one town. It has grown until today it operates in two states, Oklahoma and Arkansas, serves 242 cities, towns and communities, and has in excess of 2750 employees.

The Company's property is organized on a divisional basis, consisting of eight operating divisions. Each division operates from a headquarters city and is supervised by a division manager and his staff, which is composed of a superintendent, an auditor and a sales supervisor. Divisional personnel groups vary in size from 100 to 900 employees. The General Office is located in Oklahoma City, Okla., and serves as the headquarters for the Oklahoma City and Western Divisions. In addition, it houses the officers, General Office staff and related personnel.

The General Office staff, in addition to the officers, consists of supervisors who are responsible for the various departmental activities of the Company, such as Accounting, Engineering, Construction, Sales, Transmission-Distribution, Advertising and Publicity, Purchasing, Generation, and Personnel Administration.

In 1946 officers of the Company felt the need of a two-way communications and information program that would keep all members in the OG&E family well informed on current policies and other related company news. This program carries information two ways, from the officers and General Office department heads to the employees, and also from the employees to the top level of management.

It was decided to hold a series of meetings each month as the vehicle for disseminating information of interest both ways throughout our entire organization. These meetings range in size from 5 to 35 since it was thought we would get better individual discussion and participation in small groups.

The key meeting is held on the second Tuesday of each month in the General Office building at Oklahoma City. This meeting is called the Executive meeting and is presided over by the President of our company. The group, about 35 in number, is composed of the officers, General Office department heads, and Division Managers. Programs are developed for these meetings by the Director of Personnel Administration, with the assistance and suggestions of the President, officers and General Office department heads. A written program is prepared, indicating the subjects to be discussed and the discussion leader.

Subjects are usually assigned to an officer or General Officer department head, who develops a paper or written notes on the subject. Copies are distributed to members at the meeting. Members are also provided with memorandum paper and pencils so that they can take notes for future use. These meetings are held in the forenoon and usually last two and half hours. Ample time is allowed for general discussion and a thorough exchange of ideas takes place. Division Managers and General Office department heads are given opportunity to present subjects or questions from employees as a result of past meetings.

The Executive meeting is usually closed at 12:00 noon. In the afternoon, before returning to their homes, the Division Managers usually call on members of the General Office and discuss with them special matters pertaining to their respective divisions. Before these group meetings were started, our managers and supervisors used to come in to the General Office numerous times throughout the month, but now they handle their problems at the regular meetings, except, of course, for very important matters that require immediate attention.

The next day following the Executive meeting, which is the second Wednesday of each month, 11 General Office department heads and the eight Division Managers hold meetings in their respective offices and localities throughout the company properties. These meetings are called the General Office Department Head or Division Manager meetings and are presided over by the General Office head or Division Manager.

The group for these meetings consists in each instance of the General Office department head and his supervisor staff or the Division Manager and his staff. The material received in the Executive meeting is reviewed and discussed. Those in attendance make use of copies of the material furnished at the Executive meeting and prepare detailed notes for their meeting to be held the following day. After all subjects of the Executive meeting have been covered, time is allowed to discuss items requiring comment from previous meetings and matters important to the group's department or division.

The average attendance at these vari-

ous meetings is about five, so after the second day each month approximately 95 additional top supervisors have been informed of the subjects covered in the Executive meeting, and have been given opportunities to present the problems of the employees under their supervision. These meetings serve two purposes, a review of top management subjects, and also, an opportunity to discuss items or problems of local importance and interest.

Meetings of the third group are held on the second Thursday of the month, or on the day following the second group of meetings. These meetings are directed by the top staff supervisors and attended by foremen, key men and supervisors of small groups of employees. The material received in the previous day's meeting is covered and discussed with the group. These supervisors, foremen and key men have direct supervision of Company employees, and it is their responsibility to pass the information on to those under their supervision, either directly or by use of small meetings, depending on the nature and size of the work group.

The supervisor and employee information program makes it possible to have subjects which have been discussed by the President and officers of the Company explained within three days to the key men and foremen by top staff supervisors, thus making the information available to every member of the company by the end of the fourth day.

This system establishes a two-way flow of communication so that a specific subject can be discussed, relayed to the employee level and their reactions obtained and referred back to the Department of Personnel Administration for summary and review by the President by the fifth day. However, in some cases reactions may not be needed until the following month's meeting.

The program for the January meetings each year is an interesting one since the assigned subjects are of primary interest to all Company members. Each year a representative from each General Office department is assigned this annual subject, "A Review of 19.... and Looking Ahead For 19....." The designated department head develops a paper on the subject for his department. The length of the paper is designated, depending on the size of the department and the information expected to be covered. The length of time usually runs from five to 20 minutes.

The discussion leader develops his paper in writing and prepares sufficient numbers of copies to be passed on to members comprising the Executive, General Office Department Head and Division Manager groups. In most cases, each paper is read before the members of the Executive meeting and time is allowed for brief discussion. Since this procedure is followed, the time for the meeting is extended into the afternoon and covers a period of approximately five hours. In 1950, papers on the following departments were covered: Finance, Accounting, Construction, Generation, Transmission-Distribution, Engineering, Sales, Purchasing, Transportation, Advertising and Publicity, Franchises, and Personnel Administration.

Copies of the papers are reviewed by designated persons in the other group meetings so that all Company members will have an opportunity to receive the information. Many supervisors keep the complete set of papers for reference material to be referred to from time to time during the year. It is most interesting to see the amount of information these papers will cover and the way it is reviewed and discussed after it is made available to all employees.

The program requires time and the combined energies of the management group, but the effort is more than offset by its many proved advantages. A distinct improvement of attitude throughout the Company has been noticed since the development of this two-way communication program. There is a sense of "belonging" and the feeling of importance that is associated with being kept informed and up to date on matters which affect the Company and its members. The "grapevine" becomes less prevalent since we have a means of transmitting information on a current basis. But of utmost importance is the sense of unity between supervisors and employees that has developed as a result of the program.

Five EEI Awards for Commercial & Rural Electrification Activities Offered for Achievements in 1950

THE highest achievements for 1950 in rural electrification and specific commercial fields of the electric industry will be rewarded by 27 individual prizes included in five major annual awards sponsored by the Edison Electric Institute.

These five awards, sponsored by the Institute and presented each year to electric operating companies and their individual employees at the EEI Annual Sales Conference, are as follows:

The Thomas W. Martin Rural Electrification Award is offered by Thomas W. Martin, Chairman of the Board, Alabama Power Company, to the electric operating company which makes the greatest contribution to rural electrification and general agricultural advancement in the area it serves. The Thomas W. Martin Award consists of an engraved bronze plaque.

The Laura McCall Awards are offered by *McCall's Magazine* in memory of its founder, to give public acknowledgement to home service personnel of the electric companies for their ideas and activities which have led to an advance in modern homemaking through electrical living. The McCall Awards are divided into five categories each offering a separate plaque and cash award.

The George A. Hughes Awards are offered by Hotpoint, Inc., to recognize exceptional achievement in the promotion of electric kitchens, ranges, water heaters, dishwashers, and commercial cooking equipment. Winners in each of these five promotional fields receive a first prize consisting of a trophy and cash award, or a second prize consisting of a plaque and cash award.

The Planned Lighting Awards for 1950, sponsored by the EEI and the Better Light-Better Sight Bureau, will award 7 prizes for the best programs in residential, commercial and industrial lighting. Outstanding accomplishments in planned lighting, lighting education and sales promotion in these three classes will win engraved bronze plaques and additional cash awards.

The Frank E. Watts Awards, consisting of five engraved plaques and accompanying cash awards offered by Farm Journal, Inc., will go to electric operating companies for their accomplishments in the promotion and sales of electrically operated farm equipment as a means of improving agricultural productive efficiency.

Significance of Accounting Results for Rate Regulation

By J. Rhoads Foster
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An address before the National Conference of Electric and Gas Utility Accountants, Louisville, Ky., April 17-19, 1950

THE POSITIVE usefulness and significance of accounting reports for the purposes of rate regulation might well be taken for granted, as a kind of self-evident proposition. As an art, accounting is essential to the very existence of both business enterprise and of regulation in its present form.

Accounts and Balance Sheet

The accounts are the principal sources of information in regard to the costs which have been incurred by business enterprises and the revenues which they have realized. The balance sheet, for instance, is the only regularly available estimate of those costs which are to be treated as representing valuable assets, of benefit to future operations. The income statement is the only regularly available estimate of the costs which are appropriately treated as expenses of the accounting period and of the revenues which are appropriately treated as the source of income for the period. In short, the accounting reports furnish foundations upon which managerial, regulatory and investment decisions must of necessity be built.

I might, for example, show the significance of accounting results for rate regulation by tracing the evolution of uniform systems of accounts. You will remember that increased uniformity and consistency in public utility accounting have always preceded advances in the process of rate regulation.

It is, however, the misuse of accounting results which is the subject of chief interest and concern in the present circumstances and to which our attention is primarily directed. The title of my address might well have been "The Lack of Significance of Accounting Results for Rate Regulation," but I agree that accountants should not wear the garment of controversy as though all improper uses of accounting results are the fault of accountancy. Neither should it be assumed that only regulation is guilty of misuse of accounting results.

Accounting serves the needs of diverse groups and interests, management, stockholders, creditors, governmental agencies and others who use the financial and operating reports for diverse purposes. All are served subject to the same regulatory rules, accounting standards or conventions. Except as it is compelled to do so by regulatory order, the accounting process does not adjust itself to unique, specialized and occasional needs. It seeks to achieve a maximum usefulness. Serving all, it is incapable of serving any one purpose fully or perfectly.

Engineering, Legal and Economic Facts

It is, of course, impossible and inappropriate for accounting to be all things to all men. Moreover, the accounting process is not the only source of information available to management, to investors or to regulatory authorities. Engineering, legal and economic facts, not disclosed by the accounts, are relevant and may be of controlling significance in the making of managerial, investment or regulatory decisions, even though, ostrich-like, some commissions deny their relevance, if not their existence.

It is imprudent to expect the accounting process to provide results which it was never designed to provide, either for rate regulation or for other purposes. Accountants and those who use accounting reports should respect the results of accounting, both for what they mean and do not mean. The continued advancement of the accounting profession will depend upon its guard against misuse of accounting results, as well as upon an increased usefulness to management and regulation.

Limitations of Accounting

Therefore, the emphasis here will be placed upon the limitations of accounting as the source of economically meaningful facts for the purposes of rate regulation. Need I say that this emphasis detracts nothing from the significance of accounting results for all those uses, including rate regulation, and in all those circumstances where the accounting results are themselves uniquely useful or are consistent with the other relevant facts.

Inconclusiveness of Accounting

Prescription of the earlier uniform systems of accounts by the regulatory commissions was generally subject to the qualification, stated in many regulatory orders, that "in prescribing this system of accounts, the commission does not commit itself to the approval or acceptance of any item set out in any account, for the purpose of fixing rates or in determining other matters before the commission."

The qualification was consistent with the then limited significance of nominal capitalizations and book costs for fair return determinations. Under the historic "fair value" rule, if fair value at the time of the rate proceeding was greater than book cost, the utility was not limited to a return on such book cost. If fair value was less than book cost, the utility was not entitled to earn a return on the excess of cost over fair value. A return on whatever might be the existing capitalization was not the measure of fair and reasonable charges to consumers.

When, for example, an accounting order of the Interstate Commerce Commission was characterized as a denial of due process, the Supreme Court held:

> But this is to ignore the fact that the order is one touching accounting merely; that before any rate base could be ascertained . . . the carrier will be entitled to a full hearing. . . . The mere accounting classification can conclude neither the Commission nor the appellant upon the hearing of an application.
>
> *Norfolk and Western Railway Co. v. United States*, 287 U. S. 134, 141 (1932).

Thus, accounting results were not conclusive for rate regulation under the "fair value" rule. An accounting order

of the commission did not imply finality of disposition in determining a fair return.

Increased Administrative Discretion

The *Hope* case decision and other recent decisions by the Supreme Court renounced the rule that to avoid confiscation under the Fifth and Fourteenth Amendments a public utility must be permitted a fair return on a rate base which reflects cost of reproduction less depreciation or consideration thereof.

The Court did not substitute prudent investment or original cost for "fair value," but left to the discretion of the commissions the methods and formula to be used in determining "just and reasonable" rates. The scope of review of regulatory determinations by the *Federal* courts had at the same time been sharply limited. The courts, excepting many state courts, apply rigorously the rule that a regulatory decision must be supported by no more than "substantial evidence."

The judgment of the court as to the weight of the evidence will not be substituted for that of the commission. Now, it is obvious that a multitude of facts are available in a complex, controversial regulatory proceeding and that "substantial evidence" may support what on net balance are grossly irrational or extreme findings of the commission. Can one even be assured that such "substantial evidence" is in the direction of or carries with it the logical conclusion.

Resort to the Polls

With respect to economic legislation and regulation of business activities, the Federal courts apparently have returned nearly to the position of 1876, expressed in Munn v. Illinois, that "For protection against abuses by legislatures the people must resort to the polls, not to the Courts." (94 U.S. 113, 24 L ed. 27.)

This rule of administrative and legislative finality was reasserted by Mr. Justice Learned Hand in the *Niagara Falls Power Co.* case. He declared: "Congress alone is given power to measure and balance conflicting economic results." (137 F (2d) 787, Cir. Ct.) Thus, the effective power to review regulatory decisions was abdicated by the Federal courts.

Responsibility for developing the criteria of rate regulation thus has been largely shifted to the commissions and to the legislatures. In the exercise of this newly found discretion, regulatory commissions have been influenced by the pressure of short-term group interests and by considerations of administrative or procedural expediency. Although our court enslaved commissions have been unfettered, they have made little, if any, progress toward rational examination and development of the principles and standards of fair return determination and rate regulation.

On the contrary, some commissions have adopted methods of rate regulation largely as the means of avoiding procedural difficulties and without reference to the applicable economic or equitable standards. To illustrate, original cost or investment is adopted as the rate base in many instances, because it is arithmetically definite in amount, because the reported amount appears reliable, or may be made so by regulatory control of the accounting process, and because regulatory time and expense is reduced when the rate base may be determined by reference to the books of accounts and other evidence disregarded.

Regulation Through Accounting

This recent approach to rate regulation regards accounting as a device for controlling economic enterprise, not as a mere aid to regulation. It confers on accountancy an ill-advised potency. The goal is that the rate base, as well as the actual return, may be read directly from the books of accounts. The purpose is to solve dynamic social and economic problems through a more rigid accounting control of enterprise. Accounting would be made the sole instrument of rate regulation. It would be no longer a mere source of information, to be given such consideration and weight as may be appropriate in the light of all the relevant facts.

According to the new view, the accounts will tell the truth, the whole truth and nothing but the truth. It is, of course, the purpose of accounting to tell the truth, subject to its own appropriate framework of reference. But it cannot undertake to tell that whole truth to which joint contributions are made by accounting, engineering, economics and other fields of knowledge.

It may be that an avenue of escape from long drawn-out, tedious, expensive and uncertain valuations was needed. It may be obvious that it is the end results of rate regulation which are subject to the appropriate criteria of reasonableness, not the method and mechanics except to the extent that they predetermine the result. These considerations are not, however, the subject of our present concern. Attention is directed instead to the strained meaning and significance given to accounting results and to their misuse.

Conclusiveness of Accounting

The legal fiction that an accounting order "presents only a question of proper accounting" no longer protects public utilities against misconstruction of accounting results. Nevertheless, it continues to be asserted or implied in accounting proceedings that accounting orders are designed *merely* to secure information, that substantive rights are not involved and that accounting orders are not determinative of questions as to rates. In fact, the accounts often are made the basis of regulatory decisions, and commissions go so far as to refuse to consider or even receive other evidence.

"Finality of accounting results" tends to become a "one-way street" in rate regulation, whatever may be its procedural advantages. Asset costs, includable in a rate base under the prudent investment standard, are frequently denied a place in the asset accounts on the ground that the costs were not recognized at the time when incurred, or were charged to other accounts. The accounting alternatives were then within the discretion of the company's accounting officers.

New Regulatory Procedures

The accounting choice having been made, the discretion no longer exists. Adjustments are required for failure to retire so-called "intangibles," although the accounts may not be adjusted for failure to record asset costs, where the past practice was in either case "acceptable accounting." That the accounting discretion was exercised by management in the light of the then relative lack of significance of accounting results for rate regulation often receives no consideration. The qualities of fairness and consistency possessed by the prudent investment method, as defined by Mr. Justice Brandeis, are not applied as tests of propriety of these newer regulatory procedures.

The tendency to use accounting as the instrument of rate regulation makes it essential, therefore, that actually experienced costs be capitalized to the extent permitted by regulatory authority. If overhead costs incurred in connection

with the expansion of productive plant are not recorded in the asset accounts, they may be excluded from consideration in future rate proceedings. If the rate base is to be read directly from the accounts, asset costs will not be recoverable unless they have been recorded.

If incidental expenses of financing, or costs of eliminating unfavorable security contracts are charged to expense or to surplus, they may be excluded from consideration in determining the fair rate of return. Substantial but implicit investments made by the common stock may be not reflected and therefore not reflectable in the balance sheet. There is no longer merit in the attitude of company executives, if there ever was any, who say: "We do not capitalize overheads." Today, failure to capitalize all experienced costs of long-lived productive utility assets may prejudice the interests of their investor-owners.

Actual Costs to Serve

It may be obvious that the costs incurred to supply a utility service are not a dollar more or less because of what is or is not accounted for as the cost.

To illustrate, the character of interest during construction as an economic cost of utility assets does not depend upon its recordation in the accounts, although its status as a cost subject to recognition for rate regulation purposes may be dependent upon its having been recorded.

As another illustration, the exemption of governmentally owned utilities from tax burdens equal to those placed on private enterprise utilities shifts unavoidable costs of supplying the utility services to taxpayers in general and to consumers in other service areas. The accounted for costs of the governmentally owned utilities are thereby reduced. A subsidy is no less a subsidy because not accounted for as a part of the cost of the utility service. A cost of service is no less a cost because it is hidden and borne by taxpayers or other consumers instead of by the consumers for whose benefit it is incurred.

Cost and Value

That cost is not value is a truism. The basic cause of the differences is the changes which come with the passage of time. Even though actual cost is recorded and is the best evidence of value as at the time of the business transaction, the recorded cost of a productive asset may be either more or less than its *present* value. This is so even though there has been no change in the general level of prices. Past cost is never the same as present value, *fair* or otherwise, unless as a coincidence, but it may be useful and meaningful evidence of value.

Ours is a generally competitive, rather than a non-competitive, socialistic or communistic society. In our dynamic economy the past costs are "water over the dam." Economic cost in a competitive economy means the present and prospective cost at which a supply of goods can be produced. Not what was paid, but what will need to be paid influences business choices and determines current competitive prices. Returns realized "on investments in competitive enterprises having corresponding risks" are not measured by the original or book costs of productive property. It is free choice among such alternative costs that makes a free enterprise system economical and workable.

In circumstances where nominal dollar cost has ceased to have significance as evidence of sacrifice or value, for the purpose of rational rate regulation, it continues to be "substantial evidence" in a judicial sense, and as a matter of regulatory policy is the only evidence recognized by some of the commissions.

Recognition of the distinction between cost and value does not, of course, mean that a *fair* value for the purpose of rate regulation is necessarily the same as commercial or market value. The end sought in a rate regulation is a "fair value" which excludes the value of unfair monopoly returns.

Fair value is not measured by the capitalized value of the prospective returns under whatever may be the charges for the service. It may be noted, in this connection, that arbitrary rate regulation, when it declares original or book cost to be "fair value" without regard to the economic facts in a period of price inflation, may be itself destructive of fair values and thus go far toward eliminating a difference between the "fair value" of utility property and its past cost.

Accrued Depreciation

Just as cost should be distinguished from value, so also amortized cost should be distinguished from loss of value or depreciation in fact. Whatever may be the significance of the depreciation reserve for the purpose of fair return determination, under some methods of rate regulation or in some circumstances, it is a misuse of accounting results to pretend that the accumulated amortization of original cost of plant is a measure of depreciation in fact.

Depreciation is an economic fact or phenomenon. Depreciation in fact, or actual depreciation, is the decline, which has accrued at any given time from any and all causes, in the capacity of plant to render the totality of service for which it was originally installed.

Original Cost Depreciation

For the purposes of utility accounting, "depreciation" is defined in terms, not of value but of original cost. This is a special-purpose meaning of "depreciation." The meaning is "amortized cost or appropriately amortized cost." The amortizable cost is determined substantially by the choice of a conventionally acceptable method for systematically distributing the asset costs against the revenues of accounting periods. It follows that the amount of accounted-for depreciation is thus predetermined in substantial part by the method of amortization.

In the sense of actual depreciation or loss of value, property depreciates whether or not there is any accounting. The same is, of course, true of appreciation. Aside from the effect of regulatory practice on actual value property isn't worth a dollar more or less because of what is or is not recorded on the books, and economic choices leading to economic results in a competitive society are not determined thereby.

The depreciation reserve is not properly deducted from past cost on the ground that it is a measure of, or reasonably corresponds to, the depreciation actually existing in the property.

Janus-faced View

Deduction of the reserve for this reason takes a Janus-faced view of past and present circumstances. While it would look to the present condition of the property for the purpose of determining the deduction from the rate base, it would disregard the present circumstances of property for the purpose of determining the value component of the rate base. It would make current economic conditions the measure of the proportion to be deducted but would inconsistently disregard current conditions for the purpose of measuring the gross from which the deduction is to be made.

Past cost of property or amount of investment does not lose service value.

It is *property* which declines in value or "service value." Past cost of property or number of dollars invested can neither depreciate nor appreciate. The number of invested dollars is an unchangeable historical fact which is not affected by any of the recognized causes of depreciation.

Instability of the Dollar

To this point I have made no reference to the notorious postwar decline in the purchasing power of money. The significance of accounting results for rate regulation has been considered as though the dollar were a stable unit of measurement.

But the dollar is not in fact a fixed, stable, reliable and satisfactory standard of economic measurement. The dollar changes in size, sometimes slowly and sometimes abruptly or substantially, but in the long run tends to shrink in size.

If the change in the value of money were a mere fluctuation over a reasonably short period of time, we would have no great cause for concern. The fluctuations would be taken in stride by investors, and for regulatory purposes. However, the decline in the value of money has been substantial and probably is permanent, due to inflation of the money supply. Incomes, costs and prices have become interrelated at the present higher level of prices. Few expect the process of price adjustment to bring us back to pre-inflationary price levels.

Assuming that the precise distance from Louisville to Cincinnati is 100 miles, it is as though in prewar days the highway engineer had made calculations and prepared plans based upon a mile of 5280 feet in length only to discover that the standard measure now has in fact a length of only 2640 feet, so that the distance from Louisville to Cincinnati is 200 miles. Similarly, the use of original cost of long-lived utility properties presents distorted results, except that the consequences of the miscalculations are less obvious and are longer delayed.

The original cost of utility plant in service, constructed over a long term of years, is a conglomerate of dollars which are alike in name only. For example, if the dollar of 1950 purchasing power size be made the constant standard, plant constructed before World War I is represented in the plant accounts by 400-cent dollars but by one-fourth the equivalent number. Plant constructed before World War II is represented in the plant accounts by 200-cent dollars but by one-half the equivalent number.

An assumption that original cost dollars represent comparable real things is an expression of what Irving Fisher called the "money illusion." Original cost is the "false standard of the past," for the measurement of a fair return, as well as for general business purposes or for the purpose of measuring indemnity.

Recognition of the effect of a mere decline in the exchange value of money does not provide for investors a "profit from appreciation." The investor gets no real gain out of that appreciation in value which reflects no more than the depreciation of the dollar and is no more than sufficient to avoid a real loss of value.

It is thus a misuse of accounting results to assume that the original cost of utility property is its "fair value" for rate regulation. Reliable calculations or comparisons cannot be made, or conclusions reached, without making the appropriate adjustments for the experienced change in the size of the dollar as the unit of measurement.

Maintenance of Real Capital

Furthermore, the experienced decline in purchasing power of money has its impact on the meaning and significance of reported corporate income, or return to investors.

Return to investors is overstated, either for general accounting or for regulatory purposes, when the annual charges against revenue for "depreciation" are inadequate to maintain the integrity of the invested capital or to keep the investment "whole" in fact.

When the present and prospective dollar costs of providing an equivalent productive capacity are in excess of the original costs being matched against current revenues, a portion of the amounts determined by the accounting process to be utility operating income is not a *real* but only a *monetary,* illusory income. When a larger number of smaller dollars must be expended to acquire equivalent assets, or to do the same amount of work, the charging of the smaller number of larger original cost dollars against revenue does not maintain the purchasing power integrity of the invested capital. Failure to provide through "depreciation expense" the amounts sufficient to replace retired utility assets with new assets of equivalent service giving capacity is a real capital loss to investors although original cost dollars are fully amortized and recovered by charges against revenue.

When productive capacity must be replaced at a higher dollar cost, the deficiency will be provided for by obtaining additional capital from investors. The effect, however, is to shift forward to future generations of consumers a part of the economic cost of providing present utility services. The result of this acceptance of accounted-for income as being the actual present income available for investors is a relative present underpricing of utility service and increased risk for the future.

Such a statement of significance of accounted for income, as distinguished from real income, is not necessarily to be construed as a plea for revision of current accounting standards and procedures. We all know that the cost convention was reaffirmed by the American Institute of Accountants, largely on the ground that a change is impractical. Such an adherence to the cost convention by no means precludes appropriate recognition of economic and other facts in connection with the uses of accounting results. The art of accounting should not become a strait-jacket for economic regulation.

Extension of Price Regulation

Significant rigidities thus flow from attempts to use accounting as the instrument for regulation of economic affairs without due consideration of other relevant facts. Our attention has been directed primarily to the relationships between accounted-for costs and other measures of reasonable returns to electric, gas and other public utilities. Even broader implications appear when one considers the possibility of an extension of price regulation to businesses now generally regarded as competitive in character.

The majority of the Congressional Joint Committee on the Economic Report, with reference to the steel industry, recently recommended that a study be made to determine the extent to which the steel industry has acquired a public utility character, and that on the basis of this study Congress determine whether or not the steel industry should be regulated.

In such an extended area of price regulation, governmental authority would undertake to function as the substitute

(*Continued on page* 324)

Safety Through Training

By G. S. Van Antwerp
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A paper presented before the Transmission and Distribution Committee Meeting, EEI, Denver, Colo., May 25-26, 1950

TRAINING IS the method by which habits are established, whether it be with children or adults. With adults in industry, we try to develop good work habits in our new employees, and sometimes we hope, that if these habits have been taught properly, they will remain. But habits are not fixed; they are constantly being modified by daily practice. Some of the changes may be for the better and others for worse.

The Answer Is Training

In the transmission and distribution departments of electric utilities we have many obvious hazards. To the average layman, climbing poles is bad enough, but in addition, to work among high tension wires is as bad as working with TNT. Yet our men do it every day—and sometimes in the worst possible weather. How is it that our men do this obviously difficult, even hazardous job, and still maintain a reasonable safety record? The answer is training and follow-up of the correct, safe methods of work, using the safest possible equipment and tools.

A carefully planned training program for new employees provides the opportunity for establishing the correct safe working habits. A comprehensive follow-up program of reviewing work methods in the field provides the means of insuring that safe working habits are maintained. Review of accidents, records of progress and various forms of publicity all help toward the objective of safety on the job. In this paper, it is proposed to review the training and follow-up of employees, as well as what results may be expected. The training of new employees will be discussed first.

Training of New Employees

The traditional method of training linemen by starting them as groundmen has developed many fine linemen. But we all know the men, who after too many months of practice, could never learn to climb. There are, also, those who can climb satisfactorily, and do a reasonably good job, but never seem to be able to qualify for the top grade; obviously something is wrong that should have been picked up much earlier in the game. Then, there are the individuals who seem to be capable and conscientious, but who become involved in accidents which we are at a loss to explain. More often than not, the basic cause is improper or incomplete training. In a similar fashion, the same conditions apply for other jobs in the utility field.

Many companies feel that the best way to develop safe working habits in new men hired for linemen, splicers, meter installers and the like, is to provide a brief, intensive training course upon employment. The obvious misfits, the non-climbers, and others who fail to meet the standards of the group, are weeded out early in the course, usually within the first three weeks of employment.

Important Steps

Before starting such a program, several important steps must be taken. Some of these are:

1. Make a breakdown of the job and determine what skills and practices are to be included in the training.
2. List the skills and practices in the order that they will be done; that is, the simplest ones first, and the more difficult ones later.
3. Select suitable men for instructors. Discuss the training with them and incorporate their constructive ideas in the training program. Brief them as to what is expected of them and provide them with a schedule of the jobs.
4. Set up a suitable location for training; it is usually better if it is not too close to the working headquarters. New men usually do not do their best when observed and commented upon by skilled workmen. The instructors, also, accomplish more when not subjected to such observation.
5. Select the trainees carefully and make sure they understand what is expected of them; emphasize the importance of team work on the job.

Whenever possible the Philadelphia Electric Company has hired employees in beginning jobs and then has set up training programs to develop the new employees for high grades. Some of these programs have been entirely on-the-job training; others, such as for substation operators, have been a combination of on-the-job and periodic class room sessions. Some of these training programs have been in successful operation for over twenty years.

Administration of Training

Several hundred linemen, splicers, appliance servicemen have completed such training during the last fifteen years. All such training programs have been planned carefully by operating personnel in cooperation with specialists in the Personnel Department and other groups. Administration of the training is done ordinarily by the operating groups, assisted by staff specialists within the group, or from other departments. An outline of a six-weeks training program for lineman's helpers follows:

Lineman's Helper Training Course in Climbing, Line Construction and Maintenance at Training Lot

First Week

Nomenclature and use of tools, material, and equipment, 2 hr.

Technique of climbing: 4 one-hour periods each day—to 6 ft. level, initially, then to 14 ft. level, 20 hr.

Use of rope, slings, block and tackle, 2 hr.

Dig holes; set and gain poles, 16 hr.

Second Week

Make up guys; install anchors, guy stubs and guys, 6 hr.

Install 45 foot poles, 4 hr.

Install crossarms and rack at 14 ft. level, 1 hr.

Run wire on arms and racks; pull up, dead-end and tie in the wire, 8 hr.
Install rubber protective equipment on wires, 1 hr.
Technique of climbing: 4 one-hour periods each day—to 14 ft. level, 20 hr.

Third Week

(Energize all wires at 115-230 volts and use rubber protection), Practice phasing and make corner pole taps, 3 hr.
Perform pole top resuscitation and prone pressure, 4 hr.
Practice climbing to the 45 foot level, 11 hr.
Install and remove single and double arm at 45 foot level, 2 hr.
Install mast-arm and street lighting unit at 25 foot level on practice poles, 4 hr.
Transfer arms, wires and guys from 14 foot level to 45 foot level, 16 hr.

Fourth Week

Renew straight line pole, transfer equipment from old to new and remove the old pole, 8 hr.
Renew end pole and center pole, transfer equipment from old to new and remove the old poles, 14 hr.
Install street lights on pole line at normal level, 4 hr.
Install primary and secondary breakdowns, 4 hr.
Practice climbing—all poles, 10 hr.

Fifth Week

Install single phase transformer
(a) at low level,
(b) at normal location on pole and remove, 10 hr.
Repeat with single phase C.S.P. transformer, 10 hr.
Repeat with three-phase transformer, 10 hr.
Practice climbing—all poles, 10 hr.

Sixth Week

Lower the distribution equipment on all poles to permit erecting a transmission circuit, 4 hr.
Erect a 13.2 kv or 33 kv transmission circuit, to include ridge-pin, vertical turn, and dead-end construction, 16 hr.
Renew insulators on transmission line, 2 hr.
Remove all equipment, 8 hr.
Practice climbing—all poles, 10 hr.

Classroom sessions are scheduled for one half a day per week. If bad weather occurs, either the classes are held or training is given on certain jobs that can be done indoors. The duration in hours given for each item above is only approximate.

The class room training includes discussion of:

General safety,
Tension in ropes, slings and guys,
Unit costs of tools and equipment,
Elements of electricity,
Transformer principles and connections,
Electrical systems,
Street lighting transformers and equipment.

Bad weather jobs—done indoors—include:

Practice in tying knots,
Mounting racks,
Making taps and splices.

Such a course does not attempt to qualify new men as skilled linemen in this brief period. It does, however, insure that the men who complete the course are reasonably good climbers, that they know the tools, equipment and line appurtenances. They also have had a series of carefully planned experiences in the correct, safe way of doing the most common types of line jobs.

Six weeks of unproductive time for the new man, plus that of a lineman-instructor for every six men being trained, may seem an expensive way to train new men. Nevertheless, the advantages of developing safe working habits, under carefully controlled conditions, pays off in real dividends, not only in safety but in production.

Follow-up Work Practices in the Field

Crews who work on transmission and distribution jobs vary in size from a single troubleman or meter installer, to 8 or 10 men who may be working on a high-voltage transmission line. The average group will be about 4 or 5 men, including the foreman. Many of these men have had years of experience and it has been a long time since anyone taught them the fundamentals of their job.

Many of them have developed little knacks of doing their job, some of which are good and show a clear understanding of their problems. Others may improvise schemes that fail to recognize the hazards of the job, and are performed without accidents only because of their special skill, or under ideal conditions. The crew foreman may also have developed short cuts that seem to be safe under most conditions, but may lead to serious hazards when some unusual situation arises. To make sure that only the correct safe practices are used and the unsafe methods discarded, periodic follow-up by supervisors and others is required.

The follow-up of safe work practices in the field is the responsibility of supervision. First in the line of supervision is the crew foreman, and we all realize how important he is, in this, as well as other aspects of the job. It is his responsibility to supervise his crew, so the job will be done expeditiously and safely.

Teamwork

This includes many phases of the job that are not listed among the specifications and bill of materials for a job. He must assign his crew so that they all work as a team. He must see that the proper tools and equipment are used in the correct manner. In addition, he must keep a weather eye on the condition of his men—mental as well as physical. Viewed from any angle, it is a job requiring many talents.

If the foreman is very good—and some are—he will not need much help from the higher levels of supervision. But if he is the average foreman, he needs a periodic check-up to see that the many requirements of the job are being met. Even the best need some criticism or encouragement at times.

Much of this follow-up may be considered as training, although not of the formal type with a classroom and quizzes. A suggestion about a protective device, an explanation of the use of a new tool, a question about the best way to handle a disciplinary problem—all these and many others may be classified as informal training on the job. Such training is based on helpful cooperation rather than "Do it this way or else —."

Sell the Safe Way

Supervision should sell the safe way of working to the men on the job. With properly trained men, and good equipment and tools, this should not be too difficult a task. But if these methods fail, then disciplinary action must follow, and there must be no shirking this task when required. But with reasonable men, this rarely should be necessary.

Some of the items that should be observed and discussed with the foreman include:

1. The gradual back-sliding into old unsafe methods,
2. The development of new methods, more efficient than the old, but less safe,

3. The extent to which approved protective devices are used,
4. The hazards of new equipment, which may become apparent when tried out under job conditions.

In addition to the regular line supervision, follow-up by staff specialists can help to coordinate the activities of many groups. Since these groups have no line authority, they necessarily must depend on selling their ideas to the men in the field.

In the Philadelphia Electric Company there is a group, within the Operating Department, which is known as the Methods and Training Division. In cooperation with the Personnel Department, they supervise the training of personnel within the department. They work closely with the Safety Division in all matters that affect the operating groups. They visit all crews in the field at intervals of approximately 3 weeks and review the work practices as they are being done. Any departure from the standard procedure is discussed in a friendly way with the foreman. Items of a more general nature are followed up with divisional or departmental supervision. Suggestions and complaints originating in the field relative to tools, equipment and material are handled by this group directly with the department involved.

Standardization of Tools

The standardization of tools, equipment, and material throughout all the field forces is another objective. The promotion for general adoption and use of practical prize award suggestions by this group often leads to improved methods of work. In addition, all lost time or significant non-lost time accidents are reviewed with the crews in the field. Measures taken to prevent their recurrence are discussed and any suggestions noted for review with other crews.

Periodic foremen's meetings are another approach to safety on the job. At these meetings complete written reports of all serious accidents are reviewed and recommendations for their prevention are discussed. In addition, all lost time or potentially lost-time accidents are described and discussed. Thus, by analysis of the various factors which contribute to the accidents, much can be learned that will prevent their recurrence. New equipment, tools, materials and methods of work are discussed also, so that the foremen are kept up to date concerning the changes and improvements in their field of work.

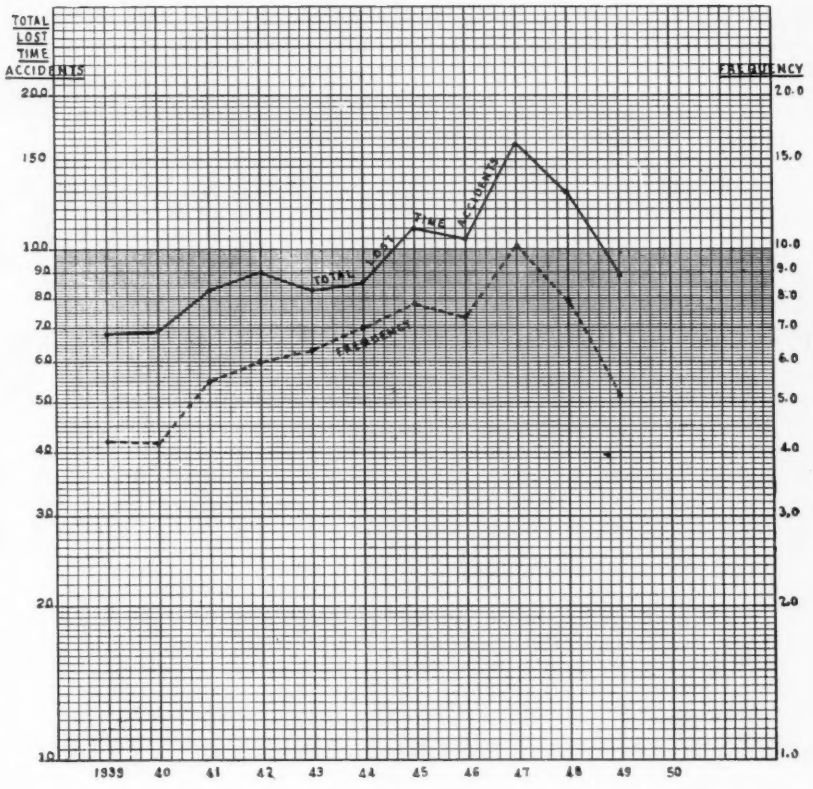

Fig. 1—Total Lost-Time Accidents and Frequency Per Million Manhours, 1939-1949—Philadelphia Electric Co.

In summary, the follow-up of work practices in the field is done by the line supervision, supplemented by special staff groups, and further augmented by discussion at periodic foremen's meetings.

How It Works Out

The measure of the success of any safety program is how it works out in practice. The standards by which a lost time accident is determined have not always been uniform among various companies. Nevertheless, there are many significant measures that can be used to show whether progress is being made. Perhaps the simplest is the arithmetical comparison of lost-time accidents from year to year. Another is the yearly comparison of lost time accidents per 100 employees. Still another, is the frequency rate per million man-hours worked.

All have certain advantages, as well as their difficulties—based on many factors. Any or all of these will provide some idea of where we stand with respect to our own past performance, and whether or not we are out of line with other departments or other companies.

The frequency rate per million manhours worked from 1939 to 1949, inclusive, for the company is shown in Fig. 1. On the same chart is shown the total number of lost time accidents for the company during the same period. It will be noted that both curves show a similar trend, particularly before and after the war years.

The average frequency rate in 1947 for all utilities of comparable size was 15.0. Since this was our worst record for many years, our frequency of 10.1 indicates our standing with other utilities. For the same same year, the national average for transmission and distribution department of comparable size was 19.6. Exact figures for our transmission and distribution department are not available, but a rough calculation indicates a frequency of about 14.0 for that year. The record for 1948 and 1949 indicates a definite improvement.

The Philadelphia Division of the Transmission and Distribution Department is a typical example. Using only the man-hours of field personnel who have the greatest exposure, and exclud-

(*Continued on page* 319)

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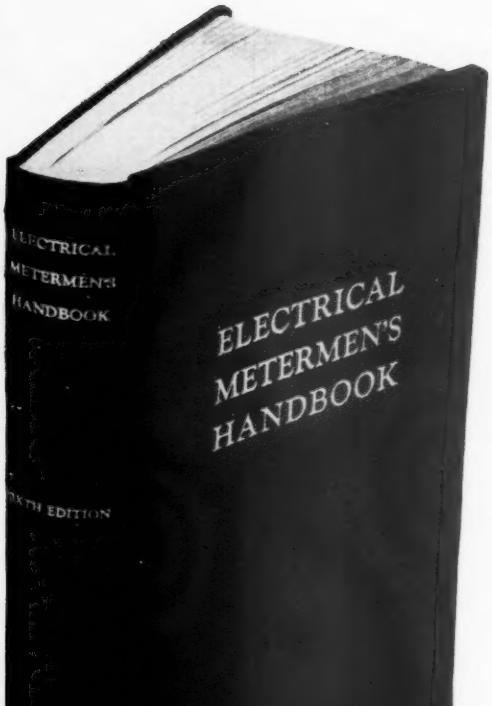

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An Analysis of the Effect of the Life of Hardware Items of Overhead Pole Line Structures on Overall Annual Costs

By E. W. Oesterreich
Duquesne Light Company

A paper presented before the Transmission and Distribution Committee Meeting, EEI, Denver, Colo., May 25, 1950

BEFORE WE CAN accurately analyze the problem of the cost of overhead line supporting structures, it is necessary to first understand the basic characteristics of such structures as they exist today.

Pole Line Structures

Generally, these structures are a combination of timber products and fabricated steel pieces of various shapes and sizes, the cost of labor and drayage of assembly being high and the unit price of the hardware items being relatively low. The structure, as originally designed and constructed, frequently is modified during its lifetime by the addition of new equipment supplementing that originally installed. Preservative materials are used to guard against the destruction of the timber products due to decay and attack by insects such as termites and ants, and protective coatings have been applied to the steel to prolong the life of the steel products under conditions of exposure to atmospheric corrosion.

In the design of these individual items, considerable attention is given by the manufacturer to competitive costs, and by the Distribution Engineer to the mechanical strength as related to the loads to be carried, the primary objective, in many instances, being "lowest investment cost." Rates of deterioration as effected by section thickness, shape, application and localized conditions are too often ignored, with the result that the individual items which, when assembled form the composite structure, will have different "life in place" values, requiring replacement as individual units.

This condition has been aggravated during the last 30 years. Untreated Chestnut, Cedar, and Pine poles used before 1920 gave about 15 years' service in place, and even under severe corrosion conditions, the galvanized hardware installed on those poles lasted that long.

About 1920-21 materials and methods for preservative treatment of pole butts were developed, on the theory that if the ground line decay or deterioration of the pole could be retarded, the life of the pole, which was the most expensive item in the structure, would be extended to perhaps 25-30 years and the annual cost of the structure would be lowered. A few years later, "full length" treated poles of certain wood species were used more generally, and in recent years, when costs of "white" poles have increased rapidly, practically all species of wood used for poles are being treated "full length" to insure longer life. No ultimate life experience data on these poles is available today but, in the opinion of authorities, the life of a properly "full length" treated pole should be at least 40 years.

Reduce "First Cost" of Line Extension

During this period when every effort was being made to extend the life of the timber products, very little was being done to retain the original coordinated design of the structure by extending the life of the hardware to correspond to the longer life of the pole. As a matter of fact, in many cases in order to reduce the "first cost" of the line extension, hardware section thicknesses were reduced to that permitted by the minimum mechanical strength requirement, with the result that the life in place was shortened.

These small, low cost items of hardware must then be replaced, as individual units, under extremely adverse conditions, since mechanical loads must be supported during replacement and the electrical equipment being supported is energized. The major part of this replacement cost is labor, which is being increased more and more in recent years by rising labor rates, lower work efficiency and greater employee benefits. While certain practices may have resulted in the lowest initial cost of investment, the annual cost over a period of years might be materially increased.

War-Time Operating Experience

The extremely high cost (on an annual cost basis) of this method of operation was stressed during the War period when War Production Board regulations for conserving critical materials required the reinstallation of hardware, even though the life expectancy was only a matter of a few years.

Serious consideration was given to this problem starting in 1941, and the results of our first investigation and study were presented in 1944 in a report by C. J. Couy on "The Deterioration Due To Age Of Materials Used in Electric Distribution System Construction And Its Effect On System Maintenance." Since it is now possible to utilize whatever kinds or quantities of materials found necessary for the most economical procedure indicated for the construction and operation of the overhead line structures, this study appropriately supplements this original work.

This presentation is made with the objective of stimulating thought in the direction of lowering the annual cost of operation of overhead lines by coordinating the structure design rather than to present a solution to each of your individual system maintenance problems. Important factors affecting the degree of benefit to be obtained or the cost of effecting these changes vary over a wide range when this problem is considered from a national point of view.

Labor rates change, the loads for which the structure is designed are different, the rates of deterioration are dissimilar, and local competitive condi-

tions may have more effect on "first cost as related to revenue to be derived" in some areas than in others. However, in order that these differences can be more readily reconciled, this analysis has been divided into three parts, which are:

1. Analysis of Costs for a Hypothetical System
2. Example of Hardware Design Possibilities
3. Practical Application to an Existing System.

Part I—Theoretical Analysis

The purpose of this part of the study is to determine, for a purely hypothetical system,

(a) The economic effect of different applications of parts of a composite pole structure supporting overhead electrical equipment, when the parts have life expectancies varying, with complete dispersion between the component parts, from the greatest difference in life of the individual parts to a complete coordination of design where all parts will have the same service life.

(b) The effect of changing labor costs upon the most economical condition indicated in the preceding determination.

(c) The increase in initial capital investment cost of pole line hardware related to a reduction in the annual cost of the composite structure.

Basic Assumptions

Certain assumptions are made in this study, as follows:

(a) Every piece of equipment will be left in service and replaced during the year when its strength has been reduced to a value just sufficient to carry the mechanical load for which it is designed.

(b) The life expectancy values are average values. It is recognized that the life characteristics of the items will vary, and the replacement requirements may be similar to a typical mortality curve, but it is assumed that the disadvantage of the shorter life portion will be compensated for by the advantage of the longer life portion. The pole was assumed as always having a life expectancy equal to or greater than any other item of material.

(c) Labor and drayage, over and above that necessary for the actual replacement, is required for each replacement to provide for traveling time to the job, unloading tools, equipping linemen, and preparing the pole for work by covering energized equipment with safety appliances. This cost is allocated to and divided between all units reaching maturity during that year, supposedly being replaced at the same time.

(d) Unless otherwise shown, the labor cost is assumed to be $2.00 per hour. This is a total cost and includes all overhead charges normally added to a basic labor rate.

(e) Material costs are based on present day prices for large consumption.

(f) The life for 100 per cent coordination is 35 years, unless otherwise specified.

In the initial phase of this study, a simple structure consisting of a pole supporting a 4-pin wooden crossarm, and a secondary rack (15 component parts) was analyzed. The cost was divided into four major groupings for each condition or combination assumed; namely—Labor to prepare for actual work of installation or replacement (this includes traveling time to the work location, unloading tools and equipment, and covering energized apparatus with safety equipment), Labor to actually replace item and to reload truck, Drayage, and Material Cost.

Replacement Cost

The number of replacements was determined by the life expectancy assumed for each type of hardware, and the number of trips to a location was modified by the coincidence of replacement cycles. The cost of "Labor to prepare for work" was divided between, and the proportionate share allocated to, all of the items whose life characteristics were such as to require replacement during any one year. These replacements were projected over a period sufficiently long to provide repeated cycles of diversified replacements to reduce to a negligible value the increase in annual costs resulting from sacrificed life of "in-place" equipment at the beginning of the period and the remaining life of some equipment at the end of the period.

A design coordination factor was adopted to permit expressing the overall life characteristics of the structure in terms of the individual item replacement requirements of any structure as compared to the replacement requirements of a structure on which all component parts reach maturity at one time. This coordination factor was assumed to be the average life of all parts of the structure divided by the life expectancy of the pole, which in this study, was always the longest of all items in the structure.

While exact price data was not available for hardware items having all of the different life expectancies assumed in this study, sufficient data was accumulated to permit establishing a general relationship between actual costs of hardware being used for which life experience data is available, and firm quotations for hardware having life expectancies which can be conservatively estimated. Cost of hardware which, in a few cases was assumed as having shorter life than that now being used, was priced in some cases of extremely short life assumptions as "black" steel products.

Segregation of Costs

No effort was made to segregate costs into charges against depreciation reserve accounts or maintenance and operating expense. It is believed that the period of time considered in this study was sufficiently long to resolve the entire problem into one of determining average annual cost as being the direct cost to keep the structure in a safe and adequate operating condition.

These average annual costs may therefore be segregated among Capital Investment or Operation Expense Accounts depending upon any definition of units of property or accounting practices. The number of dollars required for direct charges will not change, the only difference between various operations being the source from which the funds are provided and the accounting procedures established for the authorization of such funds.

Because of the fact that basic unit costs vary somewhat on different operations, and to keep from distracting attention from the general trends indicated in the study, all costs in this study are related to the cost of the structure hav-

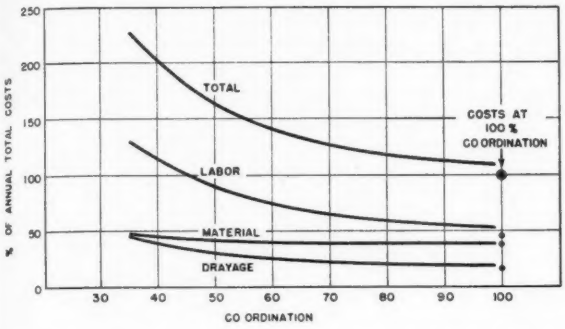

Fig. 1—Relation Between Average Annual Total, Labor, Material and Drayage Costs for Various Degrees of Design Coordination

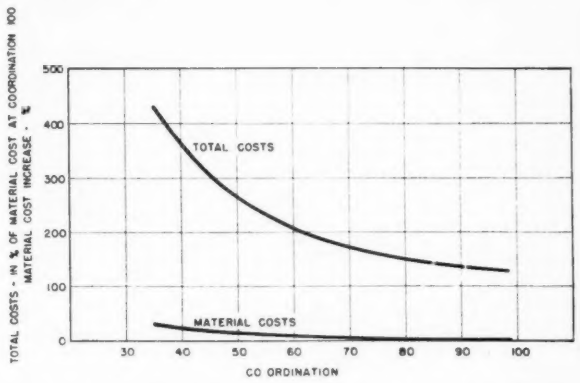

Fig. 2—Average Annual Total Cost Expressed in Terms of Average Annual Material Cost at 100 Per Cent Coordination, also Change in Average Annual Material Cost for Different Coordination Values

ing complete coordination of design. For rough comparison purposes, this structure has characteristics where Labor represents 44.8 per cent, Material 38.0 per cent, and Drayage 17.2 per cent of the total cost.

Effect of Coordination

The first objective in this study was to determine the effect of coordination of design of the structure upon the average annual cost. Fig. 1 shows the average annual cost of a structure (expressed in terms of the average annual costs of a structure having 100 per cent coordination) for different coordination factor values.

These data emphasize that the higher total cost of material for the poorest coordination, has very little effect on the overall annual cost, being only approximately 5 per cent of the increase of 125 per cent in the total costs. Labor and Drayage, however, are the primary factors in the rapid increase in the cost for the lower coordinations, the Labor cost increasing to a value 85 per cent, and Drayage to 30 per cent above that for 100 per cent coordination.

While the cost of the hardware is only of secondary importance in controlling total costs, the life of the material items determines the degree of coordination of design, the number of replacements to be made, and the labor and drayage expenditures to be incurred.

Changes in Labor and Drayage costs, for different degrees of coordination, can be evaluated in terms of the cost of material. Fig. 2 shows the change in total cost and in material cost, expressed as a percentage of material cost at coordination 100. This graph shows the amount by which the material could be increased, without changing the overall annual cost of the structure, if such increased material expenditure would result in complete coordination of design. For example, at coordination 62, the existing material cost could be doubled without increasing total costs, if such an expenditure would raise the coordination level to 100.

Annual Costs of Hardware

In the structure under consideration, the pole is of major importance in determining total material costs, but has little effect upon the change in annual costs. However, the hardware items, all of which are of relatively low cost, by determining the degree of coordination and the corresponding labor and drayage expenditures, control the changes in annual cost of the structure. By subtracting the pole costs (labor, drayage and material) from the total costs, it was possible to obtain annual costs of hardware and its related replacement labor and drayage expense.

These data when plotted as in Fig. 3 show that since the cost of the material is now reduced at a much greater rate

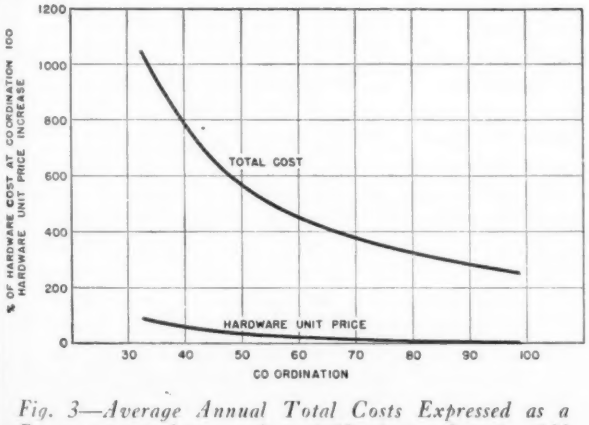

Fig. 3—Average Annual Total Costs Expressed as a Percentage of Average Annual Hardware Cost for 100 Per Cent Coordination, also Increase in Hardware Unit Cost Necessary, at Various Degrees of Coordination, to Attain 100 Per Cent Coordination

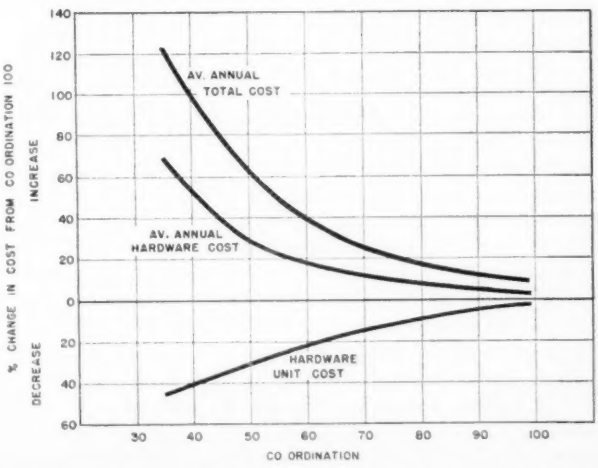

Fig. 4—Relation of Average Annual Total and Hardware Costs to Hardware Unit Costs for Various Degrees of Design Coordination

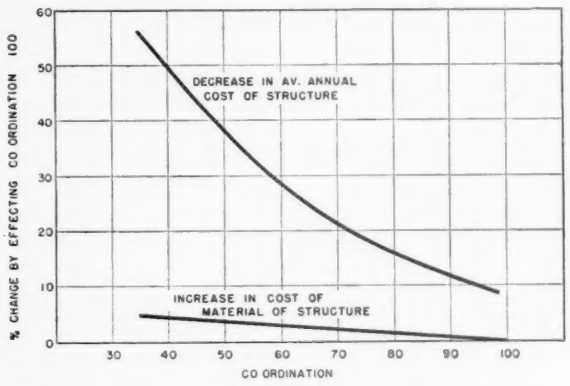
% CHANGE BY EFFECTING CO ORDINATION 100
DECREASE IN AV. ANNUAL COST OF STRUCTURE
INCREASE IN COST OF MATERIAL OF STRUCTURE
CO ORDINATION

Fig. 5—Relation Between Increase in Initial Investment for Material in Structure for First Replacement and Resulting Decrease in Average Annual Total Cost of Structure Thereafter

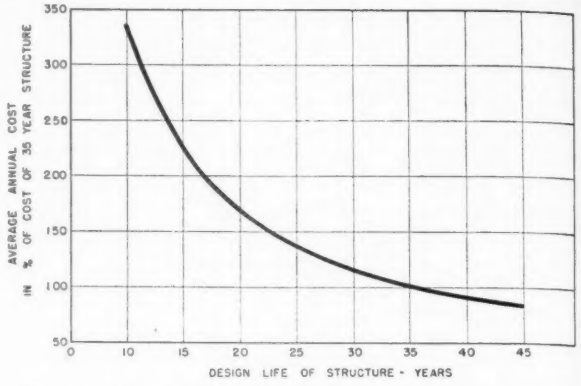

Fig. 6—Annual Cost of Structures Designed for 100 Per Cent Coordination and Different Life Expectancies, Expressed in Terms of Annual Cost of Structure Designed for 35 Years of Life

than the cost of labor and drayage, the hardware cost increase which is equivalent to total costs is considerably greater than that shown for total material including the pole.

This condition is applicable since one of the basic assumptions of this study was that the pole life, replacements and related costs would be fixed for all conditions of coordination, the variables being the hardware items. Then the relations shown will apply and hardware costs can be quadrupled at coordination 65 if such increase will raise the coordination level from 65 to 100.

Occasionally, the "lowest initial investment" principle determined the type of structure to be adopted in overhead line design. It is entirely possible to lower the initial investment requirements of most any type of structure now in use, since even the lowest cost design generally provides for protective coatings for metal products and most of the lower grade smaller poles have some preservative treatment.

Higher Annual Costs

This analysis indicates, however, that, at present day costs, if lower initial investment is accomplished by shortening the life of the parts without regard for coordination, such reduction is then directly associated with higher annual costs.

Fig. 4 shows this relationship between decreasing hardware unit prices and increasing annual costs for hardware items alone and for the complete structure.

Fig. 5 shows the reverse relationship where the increase in replacement material unit cost necessary to effect 100 per cent coordination, and the corresponding decrease in average annual costs effected by such change are plotted for different coordination levels of structures at which change is made.

For example, if a structure having a coordination of 50 per cent is completely rebuilt at one time, with materials which all have a life expectancy of 35 years, it will require an increase of 7.2 per cent in the total material cost of the first and all successive replacements, and will result in a reduction of 38 per cent in the overall annual costs. Attention is called particularly to the fact that the material cost of the structure referred to includes the cost of the pole, whereas the material cost in Fig. 4 referred to hardware material only.

All of the data heretofore, have applied to structures having various degrees of coordination of design, and on which hardware items of different life expectancies have been used for sufficiently long periods of time to develop a complete dispersion pattern.

Life of Structure "In Place"

The life of the structure "in place" has a definite effect on the annual costs. Under present labor and material price conditions, the longer the life, the lower the annual costs. While obsolescence and loss of usefulness due to municipal improvements, etc., influence the probable life of the structure, they are only important as being one of the factors to be considered when determining the value of life expectancy to design for.

Without attempting to determine how important this factor is, data have been developed, as shown in Fig. 6, to show the relation of average annual costs of 100 per cent coordinated structures for different life expectancies of structures which reach replacement age entirely due to deterioration of the component parts.

Under present-day operating conditions, one of the most unpredictable factors is the cost of labor. Not only basic labor rates, but employee benefits, both direct and indirect, imposed working conditions, and work efficiency all have a direct bearing on the ultimate cost.

In these studies, Labor has been shown to be of primary importance in establishing relative costs. In order to determine the effect of changes in labor cost from the $2.00 per hour assumed in the basic studies, increases in labor cost have been evaluated in terms of the change in design coordination which would be necessary to offset different increases in labor cost, and the per cent increase in hardware unit costs necessary to effect such improvement in coordination.

Fig. 7 shows these data plotted in a double graph on which these values are correlated. From this graph it is seen that a 19-cent-an-hour change in labor cost will require raising the coordination level of a 70 per cent structure to 78 per cent to maintain annual cost at a constant level; and, the hardware unit cost must be increased 6.5 per cent to accomplish this change.

Conclusions

Conclusions:

1. Structures with 100 per cent coordination of design have lower average annual costs than any other structure designed for a lower degree of coordination with the same pole life expectancy.
2. Within the range of present-day labor and material costs, the annual costs are lowest for the 100 per cent coordinated structure which has the longest life-span in place.
3. Hardware items, even though they are only a minor factor in the

original cost of an un-coordinated structure, control the subsequent labor and drayage costs.

4. Labor and Drayage costs are the predominant elements in the determination of annual costs of the structure.
5. Lower initial expenditures for hardware items increase the overall annual cost of the structure, if such reduction in hardware cost results in lowering the structure coordination factor.
6. Improvement in initial structure design coordination, with substantial reductions in future total average annual costs of the structure, can be effected by relatively small increases in hardware unit price.
7. Because of the major effect of labor on overall annual costs, increases in labor cost can be compensated for, and the annual cost be maintained at a constant value, by increasing material unit costs to improve the coordination on structures where the coordination is low.

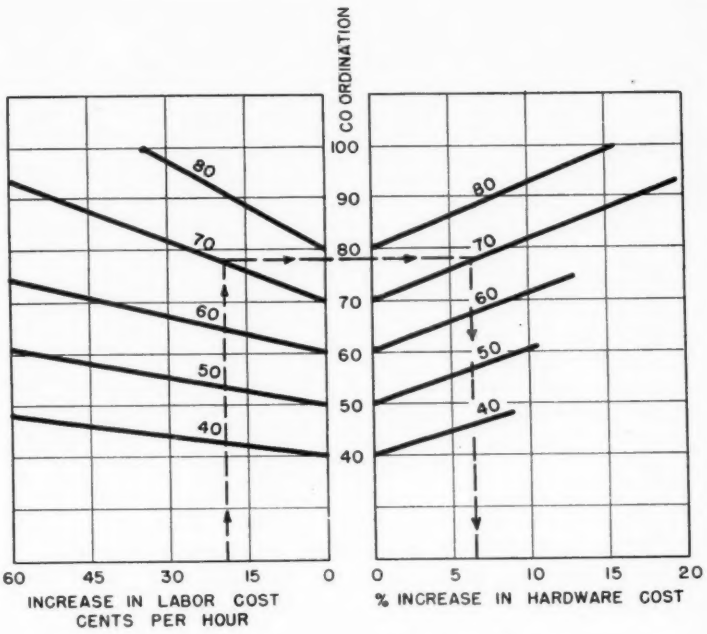

Fig. 7—Required Improvement in Coordination and Increase in Hardware Unit Cost Necessary to Effect Such Improvement to Maintain Constant Total Annual Costs Under Conditions of Changing Labor Costs

Part II—Consideration of Methods to Extend the Life Expectancy of Mild Steel Hardware

This part of the presentation has been abstracted from "A Study of Pole Line Hardware Corrosion" prepared by L. Ilgen of the Duquesne Light Company, which presents, in a more detailed manner, analysis of mechanics of corrosion, correlation of the results of different investigators, and solutions to additional typical problems of economically extending the life expectancy of more complicated structures such as street lighting mast arms. Any deletions which have been made do not indicate any intent on my part to detract from their importance, but are necessary to reduce this presentation to an allotted presentation time.

On the basis that the annual costs of an overhead line structure can be reduced if the hardware items can be designed to have a life expectancy equal to that of the pole, a study was made of the various means available to accomplish this purpose. In this study, we have confined ourselves entirely to the performance of materials under atmospheric conditions normally found in and adjacent to heavy industrial areas. When "corrosion resistance" data is quoted, it is directly related to resistance to corrosion in these atmospheres. While it is true that these corrosion rates are not generally applicable, they represent the most severe condition, and with the exception of specific highly localized conditions, define the extreme limit of design requirements.

Corrosion Rates

Rates of corrosion of metals used in these calculations were based on actual service tests. Corrosion and deterioration rates of mild steel hardware, as normally furnished to and used by the industry, were established from the results of a 3-year study by C. J. Couy, who during his study gained knowledge by removing and examining various items of hardware which had been exposed in different atmospheres for known periods of time. These data were then correlated with, or in other cases supplemented by, the results of service tests by other investigators.

Corrosion resistance of materials expressed in "penetration rates of inches per year" is a good method for comparison of one material against another, since it provides the basis for establishing the required original dimensions, of any item manufactured of a material for which penetration rates are available, necessary for the item to have prescribed mechanical strength characteristics *after* an assumed number of years in service.

Various methods of extending the life of the hardware are available, the most practical, and those which will be discussed, being the use of:

Heavier weights of zinc coating
More durable coatings
Increased section thickness of mild steel
Higher strength steels but not necessarily having better corrosion rates than mild steel
Higher corrosion resistant materials but not necessarily having greater strength than mild steel.

While it might be of more interest to illustrate the approach to this problem by the development of a more complicated assembly or structural configuration such as is commonly found in hardware items; in the interest of simplicity, most of the following discussion will involve the analysis of the problem of find-

ing the most economical method of extending the life of a simple ⅝ x 12 in. through bolt.

Use of Heavier Weights of Zinc Coating

Experience has shown that a coating of zinc and the underlying area of zinc-iron alloy over steel surfaces will add a number of years to the normal life of the "black" steel article. The additional life gained varies for different conditions of exposure, uniformity and thickness of the coating. Subcommittee VIII of ASTM Committee A5 reports the following results of field tests, conducted over a period of time in various locations where different exposure conditions might be present.

Table I—Data on Field Tests of Normal Life of Hardware Coatings Under Various Exposure Conditions

GUAGE OF BASE METAL	COATING CLASS	LIFE OF COATING TO FIRST RUST – YRS.			AVG. TIME TO COMPLETE REMOVAL OF COATING – YRS	TIME TO FIRST PERFORATION OF BASE METAL – YRS.		
	OZ/FT²	MIN [a]	AVG [b]	MAX [c]		MIN [a]	AVG [b]	MAX [c]
16	2.5	4.3	5.2	5.8	14.3	11.5	–	–
22	2.5	4.0	5.9	8.5	14.3	–	–	–
22	2.0	3.5	4.6	5.8	11.7	14.0	–	–
22	1.5	3.3	3.5	4.3	8.6	13.0	17.2	–
22	1.25	2.5	3.2	3.3	6.1	13.0	17.0	–
22	0.75	2.0	2.2	2.3	4.2	6.5	16.2	–
18	0.75	2.0	2.2	2.3	3.8	4.0	11.3	16.5
22	Uncoated					2.0	5.6	

(a) Time until first sheet showed rust or was perforated
(b) Time until 1/2 of specimens showed rust or were perforated
(c) Time until all sheets showed rust or were perforated
– Indicates no failure at 17.48 years

Most pole line hardware has a zinc coating of 1.25 oz per sq ft, this amount being what is generally considered to be the maximum that can be properly and uniformly applied to the irregular shapes. The ASTM field tests, however, were conducted with sheets, a surface which lends itself more readily to the application of uniform and heavier weight zinc coatings, and should give life experience data somewhat higher than that which can be reasonably expected from hardware shapes which have calculated equivalent weights of coatings.

Overall Life of Test Specimens

These tests show that for coatings of the 1.25 oz-per-sq-ft class, the first rust appeared in a minimum of 2.5 years and the metal was perforated in a minimum of 13 years. The same metal, exposed without coating under the same conditions, had a minimum life, to perforation, of 2 years. It is difficult to determine the point where the coating ceases to be effective, or how much the zinc-iron bond retards corrosion. However, the overall life of the test specimens generally can be distributed as follows:

Life of Zinc Coating	2.5 years
Life of Zinc-Iron Alloy Bond	8.5 "
Life of Metal	2.0 "
Overall Life	13.0 years

C. J. Couy in his investigations determined that the effectiveness of a hardware coating, of the 1.25 oz-per-sq-ft class, to be approximately 8 years when exposed in severe industrial atmospheres.

When allowance is made for differences in exposure, minimum thickness of coating and possible damage to the coating due to handling and installation of the hardware, the variation in these data is within a reasonable range.

Increased Zinc Coating

Considerable thought has been given to the practicability of increasing the thickness of the zinc coating. This matter is still in a controversial state, some engineers advocating the principle that, even though heavier average weights of coating may be applied, it is the minimum thickness of coating which determines its effectiveness, and that heavier average weights do not necessarily increase the minimum thickness and the resulting life of the hardware.

It is still further contended that in order to meet specifications for heavier weights of coating, the technique of "hot-dip" application of the zinc may be changed sufficiently to impair the quality of the zinc-iron alloy bond. Opposed to this position is that of the group operating in severe corrosion areas who believe that, even though the coating is less uniform, the major portion of the surface and particularly the joints, overlaps and fillets will have thicker coatings, and the value of this protection at vulnerable points should not be sacrificed.

It does not appear that any substantial gain in life can be attained, at this time, by increasing the thickness of the zinc coating, and the conservative estimate for gain in life due to zinc coatings must be limited to 8-11 years for severe industrial atmosphere exposures.

Use of More Durable Coatings

Some metallic coatings may be used which are considered to be more durable than the zinc already discussed; aluminum, lead and copper probably offering the greatest possibilities, either from the standpoint of practicability of application or of corrosion resistance.

All three of these coatings present more difficulties in application than zinc and probably explain why they have not been used more generally. Aluminum is extremely difficult to apply because of the tenacious aluminum oxide film which forms and prevents proper bond. Lead and copper coatings, usually applied as a plating over steel, are subject to pin hole rusting and undercutting. Minimum thicknesses of coatings of these materials which can be considered non-porous have been defined by ASTM specifications.

The life expectancy of zinc, copper, lead and aluminum protective coatings over steel is plotted in Fig. 8. This is a summary of various data, showing the effective range of coatings, either continuous or porous, of different thicknesses and the corresponding coating life which can be added to the life of an uncoated steel specimen.

By using these penetration rates or life of coatings, comparative life expectancies for mild steel bolts having coatings of the various metals can be determined. Table II shows such a compilation for comparison with zinc coatings of different thickness classes.

Use of Increased Thickness of Steel

Assuming that it is permissible for any amount of corrosion to take place, *as long as the required minimum size of the bolt is not reached before replacement,* longer life can be obtained by the initial use of a larger bolt. Penetration rates, which determine the deterioration and finally the loss of usefulness of steel products, can be obtained from time-corrosion curves.

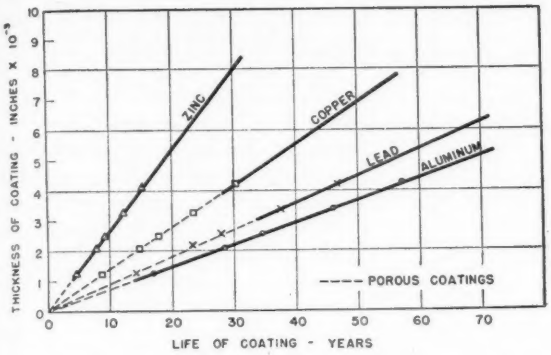

Fig. 8—Resistance to Corrosion in Industrial Atmospheres of Protective Coatings of Varying Thicknesses of Different Metals

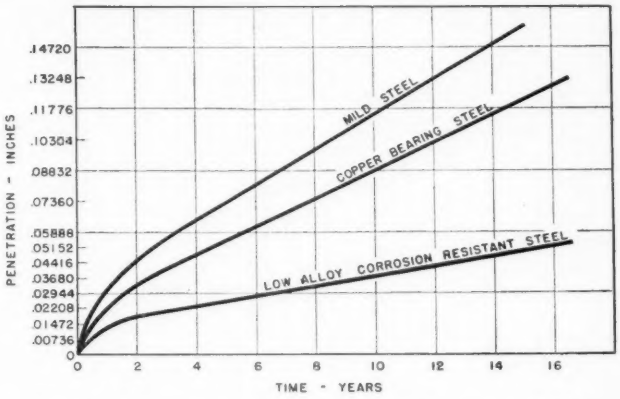

Fig. 9—Characteristic Time-Corrosion Curves for Mild Steel, Copper Bearing Steel and Low-Alloy Corrosion Resistant Steel

TABLE II—DATA FOR COMPARISON OF ALUMINUM, LEAD AND COPPER WITH ZINC COATINGS OF DIFFERENT THICKNESS CLASSES

ZINC			YEARS LIFE		
COATING CLASS OZ / FT²	THICKNESS INCHES	YEARS LIFE	ALUMINUM	LEAD	COPPER
2.5	0.0042	16.0	57.4	46.8	30.2
2.0	0.00337	12.8	46.1	37.6	24.4
1.5	0.00252	9.6	34.5	28.1	18.2
1.25	0.00210	8.0	28.7	23.4	15.2
0.75	0.00126	4.8	17.2	14.0	9.14

Aluminum, Lead and Copper were assumed to have the same coating thicknesses as Zinc

TABLE III—COMPARISON OF LIFE EXPECTANCY OF STEEL BOLTS OF VARIOUS SIZES (WITHOUT COATING)

TYPE OF STEEL	LIFE OF BOLT (WITHOUT COATING) YEARS			
	5/8" dia.	3/4" dia.	1" dia.	1 1/4" dia.
OPEN HEARTH	7	14.1	28.3	37
COPPER BEARING	10.1	19.3	37.6	
LOW ALLOY CORROSION RES'T.	37.4	57.5	97.6	

The ordinates of the time-corrosion curves shown in Fig. 9 were assigned by using values, determined in the field, by Couy, for hardware in severe industrial corrosion areas. By applying these penetration rates to bolts made of the basic materials for which time-corrosion data are shown in this graph, it is possible to calculate the length of exposure necessary to reduce various sized bolts made of the different materials to the size at which the remaining strength of the bolt is equal to the minimum strength requirement.

Table III shows the results of applying these penetration rates to such calculations. This table shows that if a zinc protective coating of 1.25 oz per sq ft is used, with its equivalent life of 8 years in all cases, then a 5/8 in. low alloy corrosion resistant steel bolt, a 1-in. copper bearing steel bolt and a 1 1/8-in. open-hearth mild steel bolt will all have approximately the same life of 45 years.

Use of Higher Strength Steel

Increased life can be obtained by the use of higher strength steels, since corrosion can progress further before reaching minimum allowable strength. With identical penetration rates, this would allow more material to corrode, and a longer time to accomplish the result.

On the assumption that the following materials all have the same corrosion rates as mild open-hearth steel, life expectancies shown in Table IV can be realized by the use of the higher strength materials listed in the tabulation.

Unfortunately, the corrosion resistance of the bolt materials listed is not well known, but it is believed that because of their chemical composition they will corrode at a slower rate than that assumed. In the case of a 5/8-in. low-alloy corrosion resistant steel bolt, both the penetration rate and the higher strength characteristics are known. On the basis of known corrosion rates it has been calculated that the bolt will have a life of 37.4 years. However, if we apply only the advantage gained by the higher strength characteristics, this calculated life is reduced to 11.5 years, requiring only 4.5 years longer, at the mild steel corrosion rate, to reduce the section so that remaining strengths are equal.

A further comparison would be that, at the lower penetration rate, it will require 24.6 years for the low-alloy corrosion resistant bolt to attain the same section dimension as the mild steel bolt, and 12.8 years more, still at the lower rate of penetration, to reduce the section to the minimum permitted. If the data in Table IV is plotted, the graph will indicate that as strength of the material increases the life increases by a decreasing

TABLE IV—LIFE EXPECTANCY OF 5/8-IN. BOLT (WITHOUT COATING) FOR VARIOUS TYPES OF STEEL

TYPE OF STEEL	YIELD POINT	YEARS LIFE (WITHOUT COATING) 5/8" BOLT
OPEN HEARTH	33,000	7.0
LOW ALLOY CORROSION RESISTANT	47,000	11.5
HIGH GRADE BOLT STEEL	65,000	15.0
HEAT TREATED CARBON STEEL	75,000	16.2

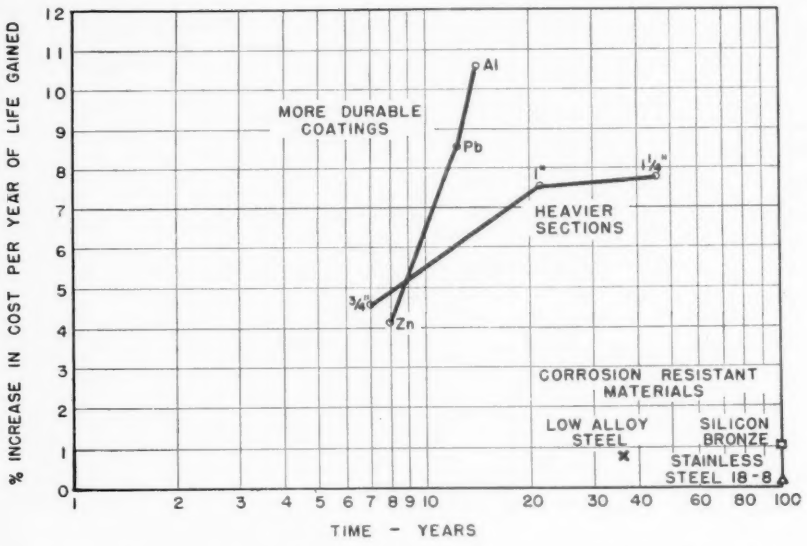

Fig. 10—Relative Cost of Extending Life Expectancy of a 5/8-In. Bolt, Using Various Methods

amount, and that a saturation point will be reached where further increases in strength of the material would produce no increase in life.

Use of Higher Corrosion Resistant Materials

Unfortunately there are no characteristic time-corrosion curves for the more durable materials such as stainless steels or non-ferrous metals. However, experience has shown that the amount of corrosion which takes place is so small that such a curve would probably approach a straight line. The penetration rates used in the following calculations for stainless steels were based on exposure tests made by the Bell Telephone Laboratories, and those for non-ferrous metals on test results reported by Subcommittee VI of the ASTM Committee B-3.

Table V shows the physical characteristics used in calculating the life expectancy of a 5/8-in. bolt, and the diameter of a bolt designed for 40-year life, when different commercially available metals and alloys are considered. It must be kept in mind, however, that because of the low modulus of elasticity of certain materials, such as silicon bronze and some aluminum alloys, permanent deformation of the threads under service conditions may make the use of these materials objectionable as bolt stock. A further restriction on taking the fullest advantage of some highly corrosion resistant materials would be, that the required bolt diameter would be so small that the overstressing of the wood fibers would prohibit their use.

Table V—Physical Characteristics Used in Calculating Life Expectancy of 5/8-In. Bolt, and Diameter of Bolt Designed for 40-Year Life

TYPE OF MATERIAL	TENSILE STRENGTH	YIELD POINT	MODULUS OF ELASTICITY	INITIAL PENETRATION IN. / YR. X NO. OF YRS.	PENETRATION RATE AFTER INITIAL CORROSION	YEARS LIFE 5/8" BOLT	BOLT DIA. REQ'D. FOR 40 YR. LIFE
MILD STEEL (Without Coating)	60,000	33,000	28,000,000	0.0178 X 3	0.0086	7.0	1 1/4"
COPPER BEARING STEEL (Without C't'g)	60,000	33,000	28,000,000	0.0172 X 2	0.0066	10.1	1"
LOW ALLOY-COR.R'T (Without Coating)	70,000	47,000	28,000,000	0.0092 X 2	0.00265	35.7	5/8"
SILICON BRONZE	60,000	45,000	15,000,000	—	0.00016	797.0	7/16"
DURALUMINUM 17 ST	55,000	40,000	10,000,000	—	0.00042	153.0	7/16"
STAINLESS STEEL 13 Chrome	65,000	35,000	30,000,000	—	0.000057	1,580	1/2"
STAINLESS STEEL 18 - 8	75,000	30,000	28,600,000	—	0.0000043	19,100	1/2"

Summary

Price data were obtained on all of the materials previously discussed, with the exception of the higher strength bolts in which case life expectancy could not be accurately determined because of unknown corrosion rates. By applying the results of life expectancy calculations with these cost data, it has been possible to plot the data to show the range within which the particular method is applicable, the cost per year of life gained.

Fig. 10 shows that durable coatings, with the exception of zinc are more costly than heavier sections for the same increase in life. Corrosion resistant materials such as silicon-bronze or stainless steel give life expectancy values considerably greater than that which could be utilized.

Most Economic Method

However, these data indicate that no method for extending the life of the bolt is as economical as the use of corrosion resistant material, and particularly so, if the characteristic of corrosion resistance is accompanied by an increase in strength.

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Part III—Analysis of Cost of Applying Design Coordination Improvement to an Uncoordinated System

In the first part of this study it was determined that systems having the greatest coordination of design had the lowest overall annual costs, and in the second part it was found that the life of hardware items could be economically extended to equal the life of a modern wood pole, by the use of corrosion resistant materials now available.

All cost data was related to structures having certain design characteristics, and cost comparisons were between two dissimilar structures rather than the cost of transposing one to another. Obviously some additional cost is involved in this transposition, either in the form of advancing the replacement of some items or by sacrificing remaining life of other items, if the change-over and the resulting reduction in annual costs is to be realized within a reasonable period of time. In this part of the study, the cost of the transition to 100 per cent coordination will be analyzed.

Existing overhead line systems are generally composed of numerous pole structures, of different ages and various life expectancies at the time they were installed. Some have been partially rebuilt since the original installation and others have had newer equipment added to the structure since the time it was first placed in service.

Over the years, unrelated changes in the design of component parts and annual additions due to an expanding system have created, at least from a life point of view, a heterogeneous conglomeration of materials, so intermixed that a general system characteristic is easier to define than one applying to any particular portion. To approximate the future requirements or liability for pole and hardware item replacements, the characteristics of a normal deviation curve have been applied, the starting point being the day that the program is put into effect, and the 50 per cent point on the curve being one half of the average life expectancy of the plant under study.

In this instance, an overhead system supported on pole structures having an average age of 15.5 years for the wood poles and the hardware having an average life expectancy of 22.7 years was analyzed. Assuming that the life in place of the newer wood poles will be 35 years, the coordination factor of approximately 65 is used. This structure life data more nearly represents a better corrosion condition than that usually found in the immediate vicinity of heavy industrial zones.

Various methods suggest themselves as being the most economical one to accomplish the change-over. Conditions peculiar to a particular system may cause the selection of one over the other.

In this study, it was assumed that complete dispersion existed, no concerted attempt having been made to extend the life of the hardware to equal that of the pole; additional facilities, such as an extra crossarm or additional phases or secondary extension, having been added to the pole after perhaps 50 per cent of the life of the pole had been used; and the system, as far as pole structures is concerned, having doubled in the last 20 years.

Consideration was given to the practicability of continuing the use of present short-life hardware for replacement purposes until the pole is renewed, at which time the structure would be rebuilt with long life hardware for complete coordination. This plan was discarded because it involved the expense of maintaining two stocks, one short life and one long life, which could be interchanged. It was estimated that the additional warehousing expense was more than the increased cost of long-life hardware.

Another plan considered was that of advancing the hardware and pole replacements so that benefits of group replacement could be attained. A few calculations showed that the advantages of group or area replacement were offset by a greater loss resulting from the value of the sacrificed life of the pole structure.

Of the methods considered, the one which showed the greatest advantage for the lowest cost, was to:

(a) Design a complete line of hardware having a life expectancy value of 40 years, if the anticipated "life in place" of the wood pole is 35 years.

(b) Replace all hardware, *when due for normal routine replacement,* with long life hardware.

(c) Rebuild all pole structures for 100 per cent coordination at any time the pole is renewed, by transferring new long-life hardware which has been in service 5 years or less and replacing all other hardware, both old and new types, with new long-life hardware. All hardware not transferred to new pole *to be scrapped.*

(d) Build all new structures for complete coordination.

Fig. 11 shows the manner in which this plan and its related liability for expenditures was plotted. The lower

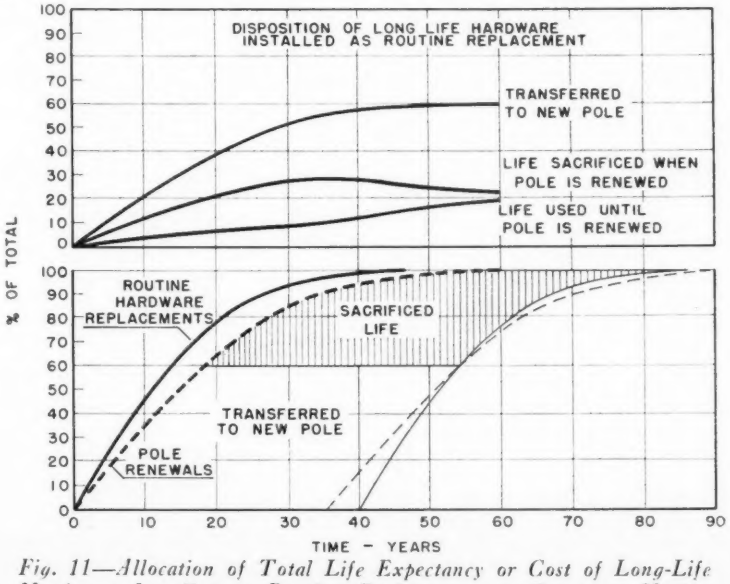
DISPOSITION OF LONG LIFE HARDWARE INSTALLED AS ROUTINE REPLACEMENT
TRANSFERRED TO NEW POLE
LIFE SACRIFICED WHEN POLE IS RENEWED
LIFE USED UNTIL POLE IS RENEWED
% OF TOTAL
ROUTINE HARDWARE REPLACEMENTS
SACRIFICED LIFE
TRANSFERRED TO NEW POLE
POLE RENEWALS
TIME - YEARS

Fig. 11—Allocation of Total Life Expectancy or Cost of Long-Life Hardware Installed as Routine Replacement on Structure Having Coordination of 64.7

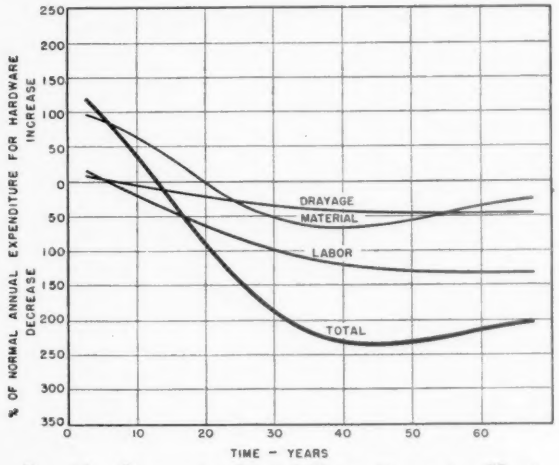

Fig. 12—Change in Annual Expenditures for Hardware and Labor During Change-Over From Coordination 64.7 to 100, All Values Being Expressed in Terms of Annual Hardware Expenditures at Coordination 64.7

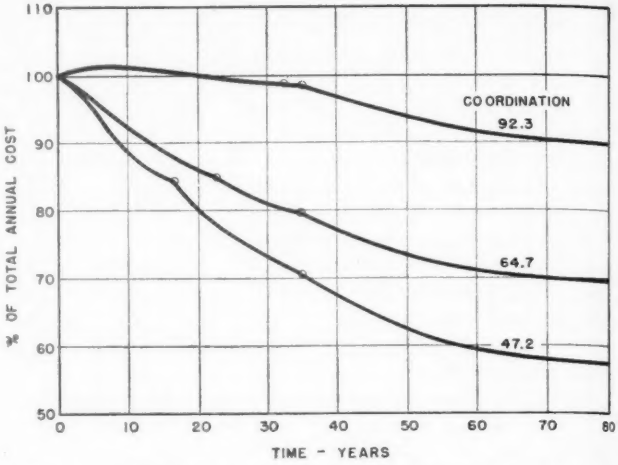

Fig. 13—Overall Change in Average Annual Costs From Beginning of Conversion to 100 Per Cent Coordination, Change in Cost Being Expressed as Percentage of Cost for Such Coordination at Start of Change-Over

graph shows the liability for both routine hardware replacement and normal pole renewal with its related hardware transfer or replacement. Since the routine hardware replacement is made at a greater rate than the requirement for pole renewals, in 20 years 75 per cent of all of the hardware has been replaced on routine replacement while only 63 per cent of the poles have been renewed.

Of the 75 per cent of the hardware installed on all poles at this time, only 60 per cent of the hardware installed on poles to be renewed, has been in service 5 years or less. Therefore, the remainder or 40 per cent has to be replaced with new hardware at the time of pole renewal.

By allocating the additional cost involved, both increased cost of hardware and the increased cost of labor to replace rather than transfer hardware, it is possible to determine the disposition of the additional expense. The upper graph shows this allocation for the cost of the long life hardware installed as routine hardware replacement.

Fig. 12 shows the change in the yearly expenditure for hardware, labor and drayage from the start of the program to attain 100 per cent coordination. Since long-life hardware costs more than that presently used, additional expenditures will be incurred for material when hardware is replaced on the normal routine schedule. Part of this increased cost is utilized when (in this case) 60 per cent of the hardware installed is transferred to the new pole. The remaining 40 per cent of the hardware, mostly new but some old, must be replaced at an increase in cost due to use of long life hardware for replacement, and an increased cost in labor and drayage due to replacement rather than transfer.

Knowing what the annual expenditure liability will be, and by arithmetic addition to the average annual costs of hardware, labor and drayage previously experienced, it is possible to determine the net change in yearly expenditures from the initiation of the program. From this graph it is seen that actual "dollar" expenditures will be greater for hardware for approximately 20 years, for labor 6 years and for total expenditures 13 years.

After these periods of time, a reduction in expenditures will be realized, until finally when 100 per cent coordination is attained, annual material expenditures will be 12 per cent lower, labor will be decreased by an amount equal to 132 per cent, and the total annual costs by an amount equal to 193 per cent of the normal annual hardware cost.

"Out of Pocket Expenditures"

The foregoing data apply to actual "out-of-pocket" expenditures, and do not take into consideration the value of the sacrificed life of the hardware replaced at the time of pole renewal, nor the reduction in material replacement liability due to transfers when structures are rebuilt for complete design coordination.

In order to properly show these values, average annual costs have been developed for this system being changed to 100 per cent coordination, calculating all costs on an annual cost basis. The increased cost of long-life hardware to be transferred at the time of pole renewal is calculated to have an average annual cost from the day of installation as routine replacement to the date of second renewal of the pole, the cost of hardware to be replaced at the time of pole renewal is allocated on an annual cost basis for the years in service, and all of the remaining value of the sacrificed life is added to the cost of the new long life hardware (replacing that on which life is sacrificed), together with the increased labor cost for replacement.

As the percentage of total poles reconstructed increases the lower annual costs are combined with the higher annual cost of the decreasing percentage of uncoordinated poles thereby giving an average annual system cost during this change-over period. These values are shown in Fig. 13 for three degrees of coordination, one approximating the operating of present mild steel hardware in the most severe industrial corrosion areas, one in an average metropolitan area and the other under least severe atmospheric corrosion conditions.

The condition representing the severest corrosion rate and the poorest coordination shows the greatest advantage from coordinating the design, the annual costs being reduced to approximately 57 per cent of the value at the start of the program. Where good coordination exists due to the hardware having almost the same life as the pole, the reduction is only 10 per cent.

(*Continued on page* 319)

New Targets

By A. G. Mayer

Manager, Farm Development Department, The Washington Water Power Company

An address before the 16th Annual EEI Sales Conference, Chicago, Ill., April 5, 1950

THE future of any nation lies in the hands of its youth. It is our duty to do everything possible to see that those hands are capable hands. We, the people in business and industry, recognize this fact. We have many youth organizations in the city which are paid for and maintained by business. Millions of dollars are contributed each year to develop play fields and recreation centers for Boy Scouts, Camp Fire Girls, Y. M. C. A., and many others for youth training, to curtail juvenile delinquency. It is money well spent and pays dividends in building better citizens for tomorrow. These youth programs are ample proof that business does recognize that the future of our nation lies in the hands of the youth of today.

Assistance for Farm Youth

If these programs for youth in the city are necessary and worthwhile, and they must be, as they are developing to a greater size each year, why do we pay no attention to rural and farm youth? Are these boys and girls a group who need no assistance? Do we imagine that they don't like to compete in projects or participate in games and sports the same as their city cousins? What has been the thinking by our leaders in business and industry on this question? Has there been any thought? From information available, private business has not participated to any great extent in developing programs for youth in the country.

Programs of Land Grant Colleges

However, this doesn't mean that there are no programs for farm youth. There is a program for farm youth instituted by our Land Grant colleges, which reaches over two and one-half million boys and girls, but that is only a small part of the total who should have a chance to participate. It is of as great importance to these farm youths as to boys and girls in our cities.

This job of farming is not a glamorous occupation, and as a way of life, is not too lucrative. In my lifetime the only time we had farm prosperity was during a world conflict. It is true that government subsidies have been a main factor in holding prices before and after the last war, but that is not a natural condition.

You or I or the farmer would not care about following an occupation that had to have a war or be subsidized for our family to have a standard of living comparable to people who live in the city. No, farm income has not been too profitable when we divide its total income over the period of years a farmer spends at farming. The boy or girl on the farm realizes these facts and are well aware of the responsibilities they will assume when they start out on their own.

This problem of keeping the farm youth of today interested in continuing to farm is one of great importance. With the uncertain conditions, the continual changing of policies, with regulations and controls, it is not too surprising that the farm future looks gloomy. At the same time, we know government planners and bureaucratic agencies are working night and day to make the farmer and his family more dependent on their assistance.

Bureaus Thrive on Unhappy People

The problems confronting the farmer today and the future are truly great in number. Today, many an advocate of planned economy has slid into office by advocating that he has a positive solution to the farm problem. "Bureaus thrive on unhappy people" and today a farm family has too many government regulations. The old folks in our country are not the only ones dreaming about security. This group of starry-eyed planners are a lot more awake to their job than we think they are. They realize that this group of farm people who have had no contact with business would be a group of people which could be used to their advantage if handled properly.

So this great give-away program was started with thousands of employees to supervise it. And the expense of these farm programs are, in most cases, borne by the taxpayer. What can be done to demonstrate at the grass roots that this program is bad and everyone is being taken, but the advocates of it who are living on the people? How can we convince the farmer that private business can help them solve their problems better, faster, and more economically than bureaucratic government. What can we do to prove to the farm family that business is not the selfish, greedy, avaricious monster that our bureaucratic planners say it is. Your approach to this problem will probably vary with your specific conditions, but we believe a youth program is paramount in our area.

Under the Governmental Wing

In this program of assistance to rural youth, we find that the farm boys and girls of today have spent practically all their life under a governmental wing. We have had a decade of direct government assistance by interest-free loans of all kinds to promote all types of tax-free ventures. The farmer and his family have had subsidies for raising pigs, for not raising pigs, subsidies for raising wheat, corn, cotton, tobacco, and not raising wheat, corn, cotton, tobacco, and all in one growing season; tax-free loans to build cooperatives to break the businessman and a continual barrage of propaganda from politicians in which they say business is grabbing all the profit. Everything has been done to drive a wedge between business and the farmer.

Depression-Born Programs

Many of these programs for a planned economy were instigated during the depression and continued as war emergencies, then they were expanded by socialistic agencies to an extent that, if continued, will bankrupt our nation. Thousands of boys and girls on the farm know of no other method of assistance for a farmer than direct help from Washington, D. C. In their mind Uncle Sam is their only help and adviser. I understand that nearly 75 per cent of

our senators and representatives come from rural communities, so just what would their thinking be about rural assistance. Farm people of all ages should be shown that government help from any source is paid by taxes from private business, so if business pays the bill in all cases, why should they not do the job themselves.

Extension Services

It has been said, and I believe it more every day, "that the only way our government has assisted the farmer without political implications is through our Land Grant colleges." Those colleges, through the Extension Service, have been doing a wonderful job in the past. The U. S. D. A. has also worked closely with our colleges, but the need for their assistance has increased and money has not been made available to allow them to carry on their job as they wish it done. Therefore, we firmly believe that wherever possible, business should assist and support the college in their program of assistance to the farmer.

Our colleges, through research and study, have developed hundreds of new ideas to help the farmer. Better breeds of cattle, sheep, swine and poultry, new methods of soil management, new fertilizer and insecticides, and new strains of grain and vegetables which produce better and higher yields. Extraordinary new methods have been discovered for accelerating the growth of fruit and vegetables, doubling their size and quality, for multiplying the number of crops and productiveness of animals, for intensifying and compressing nutritive values, meaning more food to the pound, to the inch and to the dollar. Modern machinery in the field and on the farmstead has taken many of the burdensome methods out of agriculture.

The Bottleneck

The colleges have developed all this, but the bottleneck is in getting the know-how to the farmer himself. Agricultural research in our colleges has advanced as rapidly as medicine and science and kept up with a changing world, but the application and adaptation of these new things has not been adopted to the extent that it should. A county agent can only cover so much territory and these new developments have been so numerous and extensive that it is impossible for him to cover them all. Besides, many are of a nature that requires a certain amount of educational work, and that takes time. As a result, many hundreds of farmers of today are adhering to many practices and ideas about farming taught to him by his father, who got them from his father.

What is the most important improvement made in farming practices today? Universally, I believe it has been the mechanization of his field equipment. That is an outstanding accomplishment. It was the implement dealers and farm machinery manufacturers who helped the county agent in field demonstrations and training schools at the college and in the field. It was a job well done and the farmer went for it, and we won a war as a result of the combined efforts of the college, farmer, business, and armed forces. No bureaucratic planner from Washington was required to do the job.

Success at the Local Level

This outstanding accomplishment was started at county and state levels by local people and they understood and believed in it. It was a huge success. There were no economic benefits handed out by the government to get the job done. Compare this method of operation from the grass roots to the plans handed out by our starry-eyed bureaucrats from Washington. This, I hope, illustrates my point.

Business can help on these problems and they must look at this assistance as a financial investment in their future to stay and to do business in their area. Farming is a big business and becoming more so every year, and with it, ever-increasing problems. Adequate knowledge by the farmer of tomorrow is necessary to achieve beneficial results. In fact, it is becoming a necessity for farmers to operate like modern business institutions. Business, as well as the farmer, is directly affected by the status of the farmer, so there is every reason to work together on these problems that are becoming greater as each year advances.

As I said in the beginning of this talk, there are several ways of developing a program for rural youth. However, I am of the opinion that if the programs are to be along agricultural lines, there is no need of duplicating the program of our Land Grant Colleges. They have, through the Extension Service and the vocational agriculture groups a splendid method of teaching the farmer of today and also the farmer of tomorrow.

Our company has endeavored to do everything possible to assist the county agents and 4-H agents in making their program as beneficial as possible. First, our farm representatives are all graduates in agriculture and are qualified to carry the results of experiment stations to the farm people the same as the county agents themselves. They are also men who have spent the greater part of their life on the farm and know farm problems. They help the county agent in all his work whenever he requests it, and the requests are considerable.

Need for Competent Leaders

We have endeavored to interest more men and women to become 4-H leaders, as one of the bottlenecks to this program is the lack of competent leaders. We felt that those leaders who were doing the job did not receive enough recognition for their wholesome voluntary contribution. So we provided awards in every county for the leaders who do an outstanding job with their 4-H clubs. We provide meeting places and pay expenses for these leaders to attend class, in which they are taught how to become more competent leaders. We also provide expense money for leaders to attend short courses in agriculture at the state college. One or two leaders are selected from each county by the county agent and these courses are for a one week duration.

For the outstanding boy or girl in 4-H work we contribute a scholarship to assist them in college work. The 4-H awards and electric pins are supplied by our company. We devote a considerable amount of time organizing agricultural committees in each town to get more of the business concerns interested in providing more incentive for boys and girls to take up 4-H work in soil conservation, dairy herd improvement, swine, calf and poultry projects. These clubs are organized and businessmen agree to provide awards for the outstanding accomplishments of members in the club they sponsor.

Scholarship Aid

Just a few short years ago there was not one business concern which had any contacts with this type of work and today there are hundreds who are helping and appreciate the program of the Extension Service. The vocational agriculture groups have a paid instructor and we provide scholarships to the college for outstanding boys in this group.

Electric kits are provided for construction of brooders and electric display boards for their classrooms, as well as electric equipment to be used in their course in electricity.

We devote our office windows for displays for both these groups many times a year and carry space in all our county newspapers telling of the programs being carried on by business to further the programs of the Extension Service. We also publish a farm magazine in which over 50 per cent of the space is devoted to activities of farm youth. Nothing that we can think of is left undone to demonstrate that private business is doing this job of development of our area better than any government agency in Washington.

In working with the colleges on these leader training programs we endeavor to interest all business concerns to help carry the ball to train the adults to become better leaders, who in time can assist groups of 4-H boys and girls carry out a more constructive and beneficial program.

Our fall county fairs are the climax of activity for the year and we have movies taken of the events and happenings at the fair, as well as colored slides of the displays. These films and slides are shown to groups both in and out of town the following year. Last year many thousands of people saw these films in civic groups and farm organizations. Everyone is looking forward to bigger and better fairs and displays each year and when people look forward they are well on their way toward going forward.

You, who are considering some type of a rural youth program, should go out and watch farm youth at work, at their studies and at their play. See them at the county or local fair, see their exhibits, look at their pigs, sheep and steer, see the well-groomed heifers and top quality sheep. Consider for an instance the hard work and headwork required to produce these fine animals. Go to the vocational classes in the rural schools, in the shops, out in the fields and feed lots where their projects are underway, sense their enthusiasm, their ambition, the goals they are out to reach, watch the way they take responsibility, note their ability to make decisions and their eagerness to learn.

Go to the national meetings of the 4-H and FFA members in the large cities. See them in large banquet halls talking to large audiences. They are getting ready for leadership. What they learn today will be their thinking in the future. There are over 2,000,000 4-H club boys and girls. Membership in the FFA is around 500,000. They are the leaders of today's farm youth. They will run our agriculture and a good bit of our government, our education, and our industry tomorrow.

After you have seen these youths and talked with them, I think you will feel sure that any time, money and labor which is spent on them will never be wasted. You will be convinced, I believe, that these youth of today, with our help, will have the ability to correct the mistakes of yesterday and they will succeed in building a nation that will preserve the principles that made our nation the greatest of them all.

Safety Through Training

(*Continued from page* 305)

ing the office and supervisory groups, the figures are as follows:

	1948	*1949*
Total hours worked	840,625	859,210
No. of Lost Time Accidents	13	5
Frequency	15.46	5.82
Reduction		9.64
		or 62.3%

This reduction of 62.3 per cent is a good record in any man's language. Supervision in this division feels that this record was the result of continually doing and following up of many small things rather than any one program.

Records and statistics show where we have been, but they are not of much value unless they are used to advantage in improving the record in the present, and the future. Of course, when the record is really good, we may be inclined to brag a bit and relax; then comes the inevitable increase in accidents. Similarly, when we have a bad record we work all the harder to get an improvement.

But how can we keep a good record when we have one? This is what we think: First—don't brag too much and don't relax. Then, continue the training of new men and the careful follow-up of men in the field. Don't neglect publicity. Bulletin boards, division papers and contests—are all good. Brief pertinent statements, such as "Ever alert, never hurt," "Safety is no accident" and other similar pithy mottos, can be stamped on the pay envelopes, or used as payroll inserts. All of these help to keep everyone safety conscious and aware that "Safety Has No Quitting Time."

In conclusion, all of us, down to the lowest employee, must believe in, and practice the correct, safe way of doing our job. Supervision especially must realize their responsibility, and they must keep constantly "ding-donging" at it. The results in more efficient production and the saving of human misery makes a program of safety through training well worth while.

Analysis of the Effect of the Life of Hardware Items

(*Continued from page* 316)

General Conclusions

1. Hardware items made of galvanized mild steel are usually the cause of lowering the design coordination level of a pole structure, even though they are relatively inexpensive when compared to the cost of the pole, labor or drayage.

2. A large portion of the overall labor and drayage element of pole structure expense is necessary for hardware replacement, and considerable increases in hardware unit cost can be justified if such increase in cost results in longer life hardware and a substantial improvement in design coordination.

3. Economies can be gained by a reduction in annual costs, if wood pole structures are designed so that all parts of the structure will have a life expectancy as long or longer than the pole.

4. In order to convert an uncoordinated system into one having a better design coordination, yearly expenditures for material and labor will be increased over those existing before the start of the program, before any reduction in yearly expenditures will be experienced.

5. Average annual costs will be lower, from the start of the program, on all systems except those where almost complete coordination exists at the present time.

6. All structures should be rebuilt at time of pole renewal for complete coordination, even though the adoption of this principle requires the replacement of parts which have been in service for a comparatively short time.

PERSONALS

ROBERT E. GINNA has been named to the new position of executive vice president of Rochester (N. Y.) Gas & Electric Corp. He has been vice president in charge of sales and regulatory matters.

LEO H. EAST, general superintendent of the gas division, was advanced to vice president in charge of operations. ERNEST J. HOWE adds comptroller to his title of vice president in charge of finance.

Mr. Ginna entered the utility field in 1921 as a draftsman for Brooklyn Edison Co. Later he was assigned as a student engineer in the bureau of rate research of that company's department of economics and statistics. He successively served Brooklyn Edison as technical assistant, engineering assistant, and rate research engineer.

In 1926 he joined the firm of Edward J. Cheney, New York consulting engineer, where he carried out assignments in utility valuation, depreciation studies, cost analyses, and other problems for the New England gas and electric utilities then managed by H. T. Tenney & Co. From 1930 to 1934 he did special consulting engineering work for a number of utilities.

Mr. Ginna went to Rochester Gas & Electric as a specialist in 1934 and was appointed manager of a newly created rate and economic research department. He was made assistant to the president in 1940. In 1945 he was elected vice president and in 1949 director and member of the executive committee.

Author of a number of articles on utility management and operation, Mr. Ginna has been active in various trade associations. Among his activities have been director of National Association of Electric Companies and member of its executive committee; executive member of New York State Utility Executives Conference, National Association of Sales Executives, New York State Farm Electrification Council, and Sales Executives Conference of Association of Edison Illuminating Companies group; and member of AEIC load research committee, rural and urban development committee of Edison Electric Institute, and management group for Electric Companies Advertising Program. He also has filled a number of committee posts for the American Gas Association.

SYDNEY ALLING has been named general sales manager of the Rochester Gas and Electric Corp. Associated with Mr. Alling will be the following: W. G. MCKIE, manager of domestic sales; R. D. PIKE, manager of industrial and commercial sales; J. G. ROSS, manager of service and customer relations; and D. K. SMITH, manager of gas heating sales.

Mr. Alling, who has been manager of industrial and commercial sales, has served with the company for 39 years.

RICHARD B. PARSONS has been elected president of the Quincy (Mass.) Electric Light & Power and Weymouth (Mass.) Light & Power Companies.

This promotion makes him principal officer of the South Shore companies of New England Electric System, succeeding GEORGE W. PERRY, who has retired.

Mr. Parsons started with Narragansett Electric Co., Providence, R. I., and then was transferred to New England Power Engineering & Service Co. From the post of western district engineer at Northampton, Mass., he became an executive assistant at Boston in 1934 and in 1942 vice president and manager of the Weymouth company. In 1948 he was also made manager at Quincy.

A. W. BARSTOW, merchandising manager of New England Power Service Co., has been named a vice president of New England Power Co. He will be in charge of northern district public relations with headquarters at Montpelier, Vt.

MARTIN A. O'MALLEY, who has been Mr. Barstow's assistant in Boston, has been named merchandising manager for the service company. His office will continue to be in Boston.

ROBERT E. GRAY, who has been merchandising manager for the southeastern area, with headquarters at Fall River, Mass., has been transferred to Boston as assistant merchandising manager for the service company.

C. M. TURNER has been elected vice president of Cincinnati Gas & Electric Co. and its subsidiary, Union Light, Heat & Power Co.

Mr. Turner has been in the utility industry for 30 years. He gained operations experience with the City of Seattle Light Department and Puget Sound Power & Light Co. For five years he was assistant engineer with the Washington State regulatory commission in Olympia.

In 1930 Mr. Turner joined Electric Bond & Share Co. and its subsidiary, Ebasco Services Inc., and has served them as a consultant in various parts of the United States. He is a member of the Load Research Committee of the Association of Edison Illuminating Companies and is vice chairman of the Electric Water Heating Committee of the Edison Electric Institute.

Several executive shifts have been made by South Carolina Electric & Gas Co. after the merger into it of South Carolina Power Co.

T. A. BUSBY, who was vice president in charge of operations for the former South Carolina Power Co., is being transferred to the Columbia office as system vice president in charge of operations. HOMER M. PACE will remain in Charleston as vice president in charge of all industrial, agricultural, and community development. He also will cooperate with other departments in the development and administration of plans for the furtherance of employee and public relations programs.

EUGENE LEIER, vice president, is being transferred from Columbia to Charleston to take charge of gas, electric and transportation promotion, advertising, development and administration of employee training programs, and the editing and publishing of company publications. He has been in charge of new business and public relations for South Carolina Electric & Gas.

W. H. KENDRICK will remain in the Columbia office as vice president in charge of industrial relations. J. F. RADER, also in Columbia, has been named chief engineer in general charge of major engineering, with specific responsibility for supervision of important construction jobs. ERNEST L. GODSHALK, president of the former South Carolina Power Co., is executive vice president of the combined systems. S. C. MCMEEKIN, president of the old South

Carolina Electric & Gas, continues as president.

ERWIN H. WILL has been elected vice president in charge of operations of Virginia Electric & Power Co. At the same time MONTELLE C. SMITH, a vice president since 1936, was named vice president and general manager.

Mr. Will started with Vepco, then Virginia Railway & Power Co., in the engineering department in 1922. Later he was transferred to the Norfolk properties in charge of the engineering department and then became assistant superintendent of the electric department. He was appointed manager of the Suffolk district in 1928.

From 1935 to 1947, Mr. Will served as president of El Paso (Texas) Electric Co. He returned to Vepco in 1947 as general manager of operations.

Mr. Smith, a veteran of nearly 50 years in the public utility business, joined the Stone & Webster organization as a student with Cape Breton Electric Co., Ltd., at Sydney, Nova Scotia. There he served as purchasing agent, assistant to operating executive, and superintendent of light and power.

Later he managed the Brockton & Plymouth Street Railway Co. and did electrical engineering work with the Lowell organization. He spent two years with Nova Scotia Tramway & Power Co. at Halifax as superintendent of the light and power department and then supervising the tramway department. In 1923 he returned to Sydney as manager.

Mr. Smith was made president of Baton Rouge (La.) Electric Co. in 1926 and president of El Paso Electric in 1931. Five years later he went to Vepco as vice president.

KENNETH G. OXLEY has been appointed manager of electrical operations for Dayton Power & Light Co. He has been assistant to the manager.

Mr. Oxley joined the company in 1940 as a project engineer and later became assistant superintendent of the line department. Before going to Dayton Power & Light, Mr. Oxley worked for National Gas Pipe Line Co., United Light & Power Service Co., and Iowa Electric Light & Power Co.

SAMUEL J. SCHIML has been named assistant comptroller of The Dayton Power and Light Co.

Mr. Schiml joined the company in 1927 as a stenographer, was later transferred to the accounting department, and has won a continual line of promotions. He is a past director of the Dayton Chapter of the National Association of Cost Accountants, and is an active member of the joint Taxation Committee of the EEI-AGA and a member of the National Office Management Association.

Three new department heads in the accounting division have also been named: ALFRED P. HILL, supervisor of the Machine Accounting Department; FRED D. FRANTZ, supervisor of the Property Taxes and Insurance Department; and, JOSEPH E. THEOBALD, supervisor of the Reports and Voucher Control Department.

Four executive changes have been made by Central Arizona Light & Power Co.

A. H. FORMAN, JR., has been made a vice president. He will continue to serve as assistant to the president. JOHN L. LIECTY, formerly assistant secretary and assistant treasurer, was advanced to treasurer and assistant secretary.

MILO T. WHITE was named assistant secretary and assistant treasurer. WILLIAM E. MUELLER, who has been supervisor of corporate securities, also was promoted to assistant secretary.

Mr. Forman joined Calapco last year as assistant to the president. He had been assistant to the vice president of Mississippi Power & Light Co. He has had more than 23 years of utility experience, specializing in rate and budget matters.

Mr. Liecty has been with Calapco for the past 14 years. He has been assistant secretary and assistant treasurer since 1946.

Mr. White joined the utility 25 years ago as an accountant. Since then he has been manager of the customer department and, for the past four years, assistant treasurer and auditor.

Mr. Mueller, with the company since 1927, has served in the accounting department and for the past four years has been in charge of corporate securities.

RICHARD B. ROBERTS, JR., director of economic research for Florida Power & Light Co. since 1946, has been elected a vice president.

Mr. Roberts is the author of a number of articles on the economic development of Florida, and data from studies made under his direction have been made available to civic and governmental groups working on industrial business projects.

Before joining the Florida P&L engineering department in 1926, Mr. Roberts worked for Permutit Co., New York City, and American Foundry Co., Newark, N. J. In 1927 he was made western division sales manager of the utility, with headquarters in Lakeland, and eight years later industrial sales manager. He was appointed general sales manager in 1936.

R. C. FULLERTON, assistant treasurer of Florida Power & Light Co., has been named manager of the company's southern division. He will succeed H. H. HYMAN, who is retiring.

HORACE H. FERRIN, since 1947 treasurer and assistant secretary of Oklahoma Gas and Electric Co., has been elected vice president and treasurer.

Mr. Ferrin joined OG&E in 1926. After serving two years in Shawnee as a clerk and accountant he was transferred to Oklahoma City to specialize in analytical studies and make economic surveys relating to the company and the industry.

In 1940 he was named assistant secretary and in 1945 assistant treasurer. He was advanced to treasurer in 1947, and in 1949 he was elected a director. Last year Mr. Ferrin was elected treasurer of the Oklahoma Utilities Association.

C. A. TATUM, commercial manager of Dallas Power & Light Co., and L. J. BLAIZE, assistant to the vice president, have been elected vice presidents of the company.

Mr. Tatum joined Dallas Power & Light in 1928. After holding various jobs in the commercial department he became assistant commercial manager in 1934 and commercial manager in 1939.

Mr. Blaize has spent 20 years in the company's engineering and executive departments. He started as an electrical engineer engaged in design and operation. In 1943 he was made assistant to vice president with general administrative duties. He was elected a director in 1944.

Two new vice presidents have been elected by Metropolitan Edison Co.'s board of directors. HARRY M. RANKIN, who has been chief engineer, will retain his engineering responsibilities and will

have direct supervision of power supply. WILLIAM H. MCELWAIN will be in charge of operations in the company's western division, with headquarters at York, Pa.

Four new sales appointments also have been announced. They are DANIEL K. PARK, advertising manager; BENJAMIN D. BARR, promotion director; JOHN L. BEAVER, director of commercial sales; and MRS. ELIZABETH THOMAS, director of home economics.

MR. RANKIN joined General Electric Co. at Schenectady in 1910. With that company he was a test engineer, served in the switchgear and central station engineering departments, and carried out special engineering assignments for Appalachian Electric Power Co. and Portland Railway Light & Power Co. Then he spent a year as operating engineer for Georgia Railway & Power Co.

In 1926 Mr. Rankin joined Metropolitan Edison as operating engineer. Later he held the titles of superintendent of operation and superintendent of power supply. In 1941 he was made chief engineer. He is a member of the American Institute of Electrical Engineers, the National Society of Professional Engineers, and the industry committee of Pennsylvania Electric Association.

Mr. McElwain started with New York State Electric & Gas Corp. in 1926. He first took the company's management training course and then was made assistant manager of the Brewster, N. Y., district. After two years in sales and service work he became manager of the Oneonta district of the Binghamton division in 1935.

New York State Electric & Gas made Mr. McElwain manager of its Elmira division in 1938 and manager of the Binghamton division, largest in its territory, in 1946. He joined Metropolitan Edison in 1949 as superintendent of operations, with headquarters in Reading.

A former newspaperman in New York and Pennsylvania, Mr. Park went to Metropolitan three years ago to take charge of an employee publication. He will supervise the magazine and have charge of the company's advertising and publicity.

Mr. Barr has been with the utility for 27 years in various sales and publicity capacities and is a past chairman of the advertising committee of the Pennsylvania Electric Association. He will be in charge of sales promotion and employee training.

Mr. Beaver, a commercial salesman most of his life, worked for Westchester Lighting Co., Brooklyn Edison Co., and Pennsylvania Power & Light Co. before joining Metropolitan in 1935. Formerly a teacher of home economics in Reading, Pa., and Gainesville, Fla., schools, Mrs. Thomas has been with the utility cooking equipment plant of Hotpoint for the past five years.

ALBERT J. SCOTT, superintendent of the Adams stations of Niagara Falls Power Co., has retired after nearly 46 years of service. WILLIAM OWLER will assume his duties with the title of assistant superintendent.

FRANKLYN HEYDECKE, who has retired after fifty years with Public Service Electric & Gas Co., and predecessor companies, has been comptroller of Public Service since 1948. Prior to that he was, for many years, general auditor for the company.

F. WARREN COOPER has been appointed comptroller of Public Service Electric & Gas Co., replacing FRANKLYN HEYDECKE. FRANK FREER, JR., has been appointed to succeed Mr. Cooper as assistant comptroller.

Mr. Heydecke started in the utility business with the Essex and Hudson Gas Co., a predecessor of Public Service, July 15, 1900. When Public Service was organized in 1903, he was transferred to the company's General Office in Newark. Working through several positions in the accounting and auditing department as clerk, bookkeeper, and traveling auditor, Mr. Heydecke became chief accountant in 1908 and in 1912 became auditor of the electric department of Public Service.

In 1924, Mr. Heydecke became general auditor of the electric department; in 1940 the general auditor of the electric and gas departments, and in January, 1948, was made comptroller. He was a director of Public Service Coordinated Transport and Public Service Interstate Transportation Company and has served many years as chairman of the committee on educational work for all Public Service companies.

A graduate of New York University's School of Commerce, Accounts and Finance, Class of 1908, Mr. Heydecke has been a member of the executive committee and board of directors, and is now president of the New Jersey Utilities Association, and also has served as a member of the accounting advisory committee of the Edison Electric Institute.

A graduate of New York University with a bachelor of commercial science degree, Mr. Cooper was employed as a bookkeeper with Public Service until 1920 when he was promoted to assistant chief accountant, becoming chief accountant four years later. Mr. Cooper was named assistant general auditor in 1945 and was made assistant comptroller in 1948. An active committee member of the American Gas Association, he has served on Accounting committees of the EEI. Mr. Cooper is also a member of the Institute of Internal Auditors and the Controllers Institute.

Mr. Freer started with Public Service in 1920 as a bookkeeper and was promoted to assistant chief accountant in 1935. He was named chief accountant in 1945. Mr. Freer is a graduate of New York University's School of Commerce and is a member of the American Gas Association, the General Accounting Committee, EEI, the Institute of Internal Auditors, New York, and the Federal Tax Forum, New York.

A. F. RANDOLPH has been appointed safety engineer in the electric operating department of Public Service Electric & Gas Co., Newark, N. J. He succeeds W. R. SMITH, who has retired. Mr. Randolph joined the utility in 1911 as a timekeeper. Later he served as underground construction engineer, assistant to the central division superintendent, and most recently assistant to the chief engineer of the electric engineering department.

A. N. PRENTICE, assistant to the vice-president and general manager of The Ohio Power Co., has been elected assistant general manager and a director of Indiana & Michigan Electric Co., with headquarters at Ft. Wayne. Both companies are associates in the American Gas & Electric Co. system.

Mr. Prentice has been with Ohio Power since 1928. He also is a member of the board of directors of the A. G. & E. Service Corp.

Five other major personnel changes in The Ohio Power Co. have also been announced. WILLIAM J. STEWART, superintendent of the company's Central Division, has been named managerial assistant in the company's general office at Canton. GEORGE V. PATTERSON,

assistant manager of the company's commercial-industrial department, has been appointed administrative assistant. ELMER F. SHAFFER, industrial power engineer at Zanesville, Ohio, has been named supervisor of industrial sales for the company.

The two other appointments are in the company's Central Division. LLOYD A. MCLEAN, division substation superintendent, succeeds Stewart as division superintendent. W. BARKER WOOD, chief clerk in the Canton district, has been named division chief clerk.

GEORGE N. HAWLEY has been appointed assistant to the president of Southern California Edison Co. JOHN H. MEAD, district manager at Long Beach, was named assistant vice president of the commercial department. HENRY C. RICE, manager of domestic sales, will succeed Mr. Hawley as sales manager, and JOHN H. ADAMS will succeed Mr. Rice with the title of director of domestic load development. Mr. Hawley joined the company from Westinghouse Electric Corp. in 1928 as an industrial sales engineer and later served as manager of industrial and commercial sales.

Eight assistant vice presidents and an assistant to the president have been named by the Long Island Lighting Co. Those elected to assistant vice presidencies are: LOUIS A. EVARTS, gas operating manager; E. C. DUFFY, electric operating manager; WILLIAM WELCH, JR., engineering manager; H. B. WAKEMAN, customer relations manager; W. J. SCHMIDT, general sales manager; W. A. MILLER, JR., personnel officer; C. Y. OSBURN, assistant to the operating vice president; and W. H. SEAMAN, insurance manager.

JOHN J. TUOHY, attorney on the legal staff, has been elected assistant to the president.

In addition to assuming their new executive responsibilities, these officers will continue their present departmental functions.

RUSSELL F. PABST has been appointed director of industrial relations of Kansas Gas and Electric Co.

Widely known in utility circles, Mr. Pabst has been associated with Ebasco Services Inc., of New York, as public relations, advertising and sales promotion consultant for the past 13 years.

He started in the utility business some 30 years ago when he joined the Penn-Ohio Power & Light Co. in Youngstown, Ohio. There he began work in the treasury department, but later went over to the commercial side of the business, first in selling electric cooking to commercial customers and then organizing and operating that company's first venture in appliance merchandising.

In 1931 he joined the Monongahela West Penn Public Service Co. and devoted nearly six years to sales promotion activities in West Virginia. His desire for broader experience and opportunities took him to Ebasco in 1937. During world War II he enlisted and served for over three years with the Army Service Forces.

S. S. SMITH, JR., has been appointed superintendent of operations for the northern division of the distribution department of Duquesne Light Co. Mr. Smith joined the company in 1927. He succeeds M. J. SCHELLER, who has been transferred to the department's general office.

A. E. BEATTIE, assistant superintendent of engineering for Gulf States Utilities Co., Beaumont, Tex., has been appointed superintendent of planning. He will be responsible for system planning, system operations, and the survey and right-of-way matters now handled by the system engineering department. R. W. SHERWOOD, design engineer, was named superintendent of design to direct electrical and mechanical engineering and design.

WILLIAM F. ROONEY has been appointed a general sales engineer in the sales and marketing department of Ebasco Services Inc., with headquarters in New York City. He has served as lighting sales and then general sales manager of Western Massachusetts Electric Co., Springfield; in the lighting sales department of Boston Edison Co.; manager of special product sales and director of product styling for Sylvania Electric Products, Inc.; merchandise manager of special product sales and director of product styling for Sylvania Electric Products, Inc.; merchandise manager for the Edwards Co., Inc., Norwalk, Conn.; and merchandising supervisor for Westinghouse Electric Corp. in Boston.

THOMAS F. CONWAY has been appointed general supervisor of the customers accounting department of Philadelphia Electric Co. Mr. Conway, who joined the company in 1924 as assistant clerk in the controllers department, has been supervisor of customers accounts in the Ardmore division office since 1946.

H. RICHARD TAYLOR, safety instructor in the Lancaster and Harrisburg divisions of Pennsylvania Power & Light Co., has been appointed safety engineer for the company. He succeeds the late P. L. G. Hasskarl. Mr. Taylor joined Edison Electric Co., predecessor to PP&L in Lancaster, in 1926 as a distribution engineer. He was transferred to the safety department there in 1931 and has been in first aid and safety training since then.

HERBERT A. MOODY, hydraulic engineer of Western Massachusetts Electric Co., Turners Falls, has retired after 37 years' service. He has been closely connected with hydroelectric developments on the system since construction of the Cabot station began, including the Cobble Mountain development on the Westfield Little River.

ROGER D. LEY has been appointed hydraulic engineer of Western Massachusetts Electric Co., Turner Falls, to succeed MR. MOODY. Mr. Ley joined the company in 1946 after some years of government work.

WALTER F. NORCROSS, assistant chief engineer of Brockton (Mass.) Edison Co.'s East Bridgewater steam plant since 1940, has retired. He entered the company's service in 1912.

WILLIAM J. STRUBE, general superintendent of distribution for Niagara Mohawk Power Corp.'s Niagara district since 1940, has retired after 32 years.

CLIFTON R. HAYES has retired from Fitchburg (Mass.) Gas & Electric Light Co. after 41 years' service. For a number of years he was engineering manager of the then Charles H. Tenney & Co. organization at Boston, which operated the Fitchburg and other utilities. During his term of direct service in the Fitchburg company, Hayes was electrical superintendent, manager, general superintendent, and since 1943 engineer.

Significance of Accounting Results for Rate Regulation

(*Continued from page* 302)

for competitive forces, which are alleged to be ineffective as determinants of reasonable prices. Even assuming that regulatory methods would not be selected in order to benefit one social group at another's expense, the immensity of the administrative task would give a necessary precedence to procedural facility.

It follows that the more difficult and subjective economic criteria would give way to measures of reasonableness which possess the appearance of precision and objectivity. It may be expected, therefore, that accounting would grow in importance as the instrument of governmental control. If the recent developments in rate regulations foreshadow things to come, appropriate adjustments would not be made for the change in the size of the dollar as the unit of measurement. Accounting results would be misused in an even larger area of regulation.

Such price regulation would necessarily fail to function as a substitute for competition. Prices of goods, wages of labor and wages of capital would not correspond to those which would be established by free and effective competition. The unavoidable result of such regulated price maladjustments, at least as long as individual freedom of economic choice remains, would be an uneconomic distribution of productive resources.

Who can doubt that still further expansion of the area of governmental price control would then be the prospect? Return to free competition, as the remedy for the maladjustments created by rigid regulatory formula, would be opposed by both the regulatory officials and by those groups who would have benefited at the expense of others. Their newly vested and anti-social interests would be protected by more and more governmental control.

It is time that those who respect accounting and would maintain an enterprise economy call a halt to the misuses of accounting results by recognizing and asserting both the limited meaning of accounting results and the regulatory abuses which are committed in the name of accounting.

CONVENTIONS AND MEETINGS

1950

SEPTEMBER

10-13 Northwestern Section, International Association of Electrical Inspectors, New Washington Hotel, Seattle, Wash.
11-12 Accident Prevention Committee, EEI, Hotel Cleveland, Cleveland, Ohio.
14-15 Public Information Program, Hotel Stevens, Chicago, Ill.
21-22 Farm Section Committees, Commercial Div., EEI, Commodore Hotel, N.Y.C.
25-27 American Trade Association Executives Annual Meeting, Somerset Hotel, Boston, Mass.
27-29 Canadian Electrical Manufacturers Association Annual Meeting, General Brock Hotel, Niagara Falls, Ontario, Can.
27-30 Association of Edison Illuminating Companies Annual Meeting, Colorado Springs, Colo.

OCTOBER

2-3 Prime Movers Committee, EEI, Copley Plaza Hotel, Boston, Mass.
2-6 American Gas Association Annual Convention, Atlantic City, N. J.
3-5 American Institute of Electrical Engineers, District No. 2, Baltimore, Md.
5-6 Pennsylvania Electric Association, Transmission and Distribution Committee, Irem Temple Country Club, Dallas, Pa.
8-11 47th Annual Convention, Rocky Mountain Electrical League, Broadmoor Hotel, Colorado Springs, Colo.
9-10 Electric Equipment Committee, EEI, Chamberlin Hotel, Old Point Comfort, Va.
11-13 Indiana Electric Association Annual Convention, French Lick Springs Hotel, French Lick, Ind.
11-13 American Society of Civil Engineers, Fall Meeting, Chicago, Ill.
11-14 International Association of Electrical Leagues, 15th Annual Conference, Copley Plaza Hotel, Boston, Mass.
16-17 Iowa Utilities Association Management Conference, Fort Des Moines Hotel, Des Moines, Iowa.
16-20 38th National Safety Congress, Chicago, Ill.
17 Oklahoma Utilities Association, Western District, Chickasha, Okla.
17-21 National Electrical Contractors Association Annual Convention, Biltmore Hotel, Los Angeles, Calif.
19 Oklahoma Utilities Association, Eastern District, Muskogee, Okla.
19-20 Transmission and Distribution Committee, EEI, Hotel New Yorker, New York, N. Y.
23-27 American Institute of Electrical Engineers, Fall General Meeting, Skirvin Hotel, Oklahoma City, Okla.
25-27 Meter and Service Committee, EEI, Robert Treat Hotel, Newark, N. J.

NOVEMBER

2 Pacific Coast Electrical Association, Operating Economics Section Conference, San Francisco, Calif.
8-10 Wisconsin Utilities Association, Electric and Gas Section, Schroeder Hotel, Milwaukee, Wisc.
9 Pacific Coast Electrical Association, Business Development Section Conference. Fresno, Calif.
13-15 Industrial Relations Committee, EEI, Fall Round Table Conference, Netherlands Plaza Hotel, Cincinnati, Ohio.
13-16 National Electrical Manufacturers Association, Chalfonte-Haddon Hall, Atlantic City, N. J.
16-17 Pacific Coast Electrical Association, Administrative Services Section Conference, Los Angeles, Calif.
27-29 A.S.A. Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y.

1951

JANUARY

22-26 American Institute of Electrical Engineers, Annual Meeting, New York, N. Y.

MARCH

10-13 National Electrical Manufacturers Association, Chicago, Ill.

APRIL

2-5 17th Annual EEI Sales Conference, Edgewater Beach Hotel, Chicago, Ill.
23-25 1951 Conference of Electric and Gas Utility Accountants, Hotel Sherman, Chicago, Ill.

JUNE

4-7 EDISON ELECTRIC INSTITUTE, Nineteenth Annual Convention, Denver, Colo.

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